Telephony.

THE AMERICAN TELEPHONE JOURNAL

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The California Franchise Cases.

Important litigation is being carried on in California to determine whether or not it is necessary for telephone companies, doing an interstate business, to have local franchises. The latest decision on the subject is by the United States Court of Appeals, which has held that the Sunset Telephone & Telegraph Company can not be required to secure a franchise to do business in Pomona. This decision will, no doubt, have an important bearing on the Pasadena and other cases. So far as the situation of Pomona is concerned, it will not be important in itself as there are but few Bell telephones in the city. The case will be carried to the United States Supreme Court for a final decision.

The gist of the decision of the Court of Appeals is, that a telephone company, doing interstate business, does not need a municipal franchise to permit it to do intrastate business. This gives to every corporation, large enough to carry on an interstate business, an undue advantage over the small company which furnishes service within the state only. Such a company must bear the burdens imposed by the state law from which its more powerful competitors are free. Equality between companies would therefore seem to require a reversal by the Supreme Court of the Court of Appeals' decision. But a decision on this basis is not to be looked for, as legislative bodies are not required by constitutional law to treat everyone alike. They may favor some and hinder others in the granting of franchises. Therefore, if a different decision is reached by the Supreme Court in the California cases, it will be placed upon other grounds than those of fair dealing to all corporations in the state.

Proper Application of Force.

The beginner in the telephone art has much to learn regarding the relative degrees of force to be applied in the various operations connected with line and apparatus. The common two-wire splice, apparently a simple thing, is not as easily learned as it would seem.

After making his initial splice the beginner is told to "Twist her up tighter, till you can't see daylight between the wires in the neck." Accordingly he next proceeds to do a good job by twisting them so tightly that the wire is "burnt" and so weakened that the splice is easily broken.

The exact degree of force to be applied is learned only by practice. It can not be done mechanically. Intelligent care must accompany each operation until the details are thoroughly mastered.

A similar victim of too much energy is the terminal insulator. In dead ending an iron wire the beginner often twists the free end too close to the glass. The close twist and the sharp angle, weaken the attachment so that it is easily broken.

The same fact holds true regarding such small parts as the nuts and screws, used on various parts of telephone apparatus. If not tightened enough, they will work loose and give aggravating service. But often the threads are easily stripped if a generous amount of force be applied and an important piece of apparatus rendered useless.

The beginner is not alone in his troubles, however, for the tried and true linesman comes in for a share. It often happens that a rural telephone gets out of order at a time when a lineman is the only person near or available. It is economy to have him fix it if he can. Now, imagine a man used to the heavy work of climbing poles, putting on cross arms, and twisting up No. 12 iron wire, suddenly having to adjust or handle the relatively delicate parts of a telephone. As a rule our linemen are good, strong fellows, good natured and willing to help in any way. But the stripped adjust or handle the relatively delicate parts of a telephone. story of misdirected energy. A little care and thought will enable the lineman to learn the art of adjusting his strength to varying conditions and so making himself more valuable as an all around telephone man.

The Telephone and World Citizenship.

When abroad the average American proclaims his nationality frequently, or at all events makes no serious attempt to identify himself with the permanent interests of the country in which he is located. Nor is he inclined to consider a definition of his attitude with any feeling not akin to pride and complacency. But in Oakland, California, the opening of a new telephone exchange in a quarter principally occupied by the Chinese and Japanese has brought to the front an opposite trait of Oriental character. The merchants of the far East characterize as improper discrimination the designation of their central office by the name "Pekin." Instead of admiring an arrangement which might have been expected to further their convenience, they want an American name before their telephone numbers, and American operators, instead of Chinese, and have been urgent in their demand for a change.

In New York, politics has long been a great factor in the Americanization of immigrants from Europe. On the Pacific Coast the Oriental immigrant, even though he cannot vote, seems to be thoroughly naturalized in his telephone habits.

Those who speculate on the possibilities of the adoption of a universal language are not, as a rule, in the habit of looking forward to the general establishment of transoceanic telephone service, but should it ever come, America and England, with their preponderating telephone development and world spread commercial relations, will exert more influence toward the adoption of uniform language by the spoken word in business communications than idealizing has been able to accomplish in all the centuries since the promoters and engineers of Babel were outwitted and shamed by a Mightier Power. Already grammarians are in dispute as to what constitutes the true Esperanto; but the borders of telephonic communication are ever expanding.

Defensive Publicity Not Sufficient.

Uncle Joe Cannon spoke at the bankers' convention in Chicago this week. Possibly to counteract an impression which has been spread by some newspapers since Speaker Cannon has been helping us to get a new tariff bill, he took occasion to express the sentiment that "the people from Podunk and the Four Corners are still the ones who run the country." It was good policy for him to say this, but probably he believes it, too. For it simply means, in the last analysis, that once in so often even the most exalted tariff maker must go back to them for votes. He must have votes.

In the same way, remotely but assuredly, the subscribers control the telephone business. Telephone companies exist because the people buy service from them. Where there are two companies, the Independent organization owes any advantage it may have to the support of "home folks." If it is rightly managed, and is known to be so in the locality where it operates, it has one great essential of a firm foundation.

One condition which Independent companies face is the constant exposure to attack through the various mediums of publicity which are open to their competitor. To fortify itself against these attacks, a local company must not only give good service, and make its securities profitable to their holders, but must have the public at large know that these conditions prevail. It must educate the home folks to acquire a frame of mind which will make them its volunteer defenders whenever they note that it is being attacked. It is not sufficient to have records in the office which will refute false statements of a damaging character after they are made. The evidence must be in the hands of the people all the time. They must be ready to say of their own initiative, "The Independent companies are doing the business, and have scared the other fellow so badly that he is slinging mud." Independent telephone companies which confine themselves to defensive publicity are only playing half the game—and need to recall Josh Billings' little pronouncement on the man "who gets his lick in fust."

Protection.

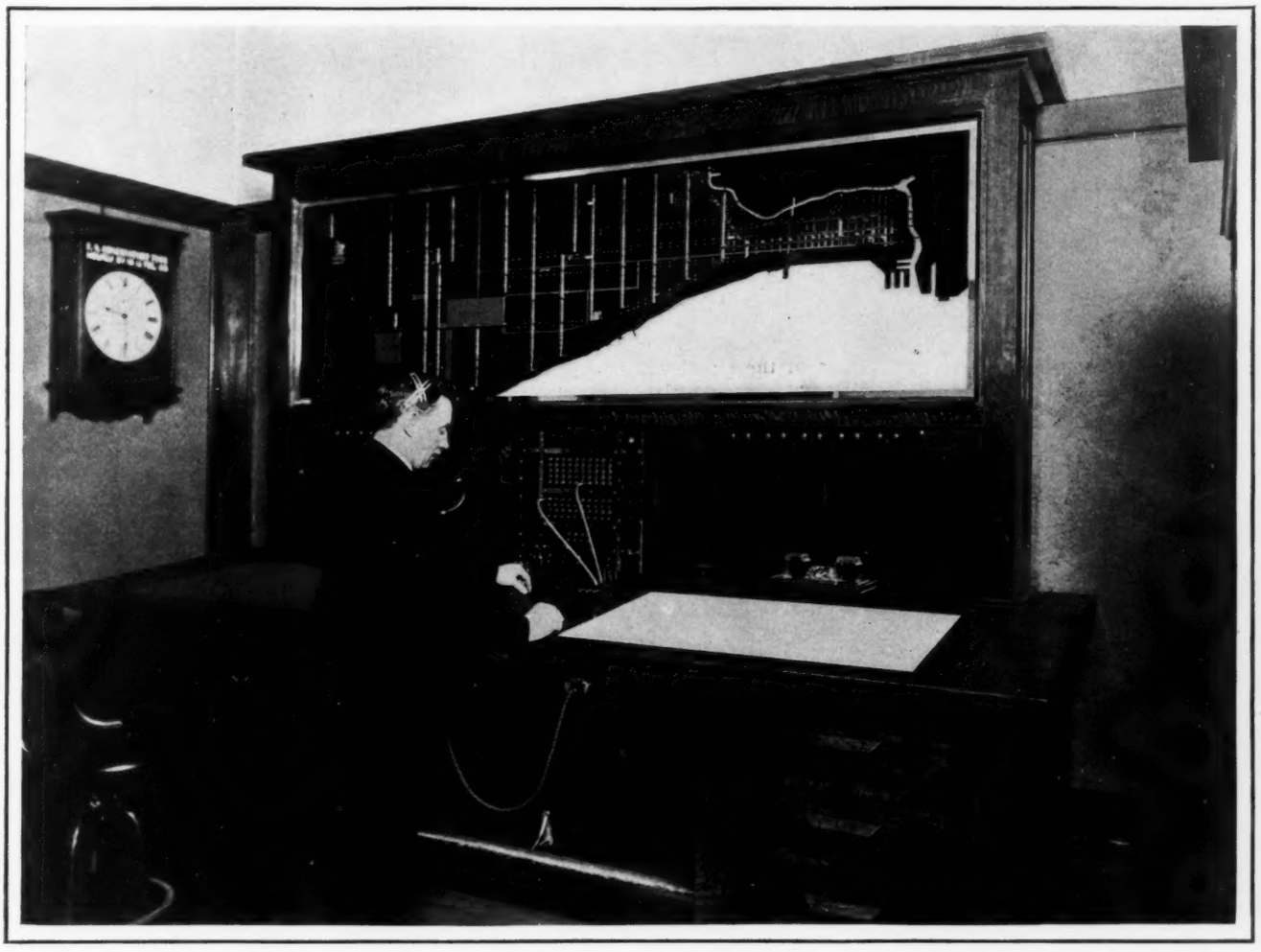
The Illinois courts were called upon recently to hear evidence in a suit for damages against a telephone company, arising from the death of a subscriber who made contact with wires alleged to have been led into the substation without adequate protective appliances. In various places, although little publicity has been given to the fact, deficient protection has been the cause of disastrous fires in central office equipment.

Fire hazard and risk of personal injury become negligible when the best of modern protective devices are properly installed and regularly inspected.

The Telephone in Electric Railway Service

By S. R. Edwards

Telephones have been used for a great many purposes and are now rapidly coming into general use by the steam railroads for train dispatching. The electric railways are not far behind the steam railroads in the use of the telephones, and many interurban electric lines are operating their cars more or less by use of the telephone. It remained, however, for the Chicago City Railway Company to work out a plan for handling cars in a large city by the use of this practically indispensable instrument. For over a year the movements of cars on this company's system have been greatly facilitated by a systematic use of the telephone by its car starters and conductors.



The Unique Telephone Switchboard by Means of Which the Car Service of the Chicago City Railway Company's System Is Regulated.

As is the custom with all electric railways, cars are operated according to printed schedules, which allow a little time for the cars to lay over at the end of the route in order to make up for delays and unforeseen accidents. This schedule, however, does not provide for the handling of cars when a line is blocked up by fire or other interruptions to traffic. In order to provide against these interruptions to traffic, and also to reduce the length of time which a car lays over at the end of the route, the Chicago City Railway Company adopted a telephone system to be used in connection with the dispatching and the operation of its cars. For this purpose a rather novel switchboard has been installed at the Cottage Grove Avenue car house.

As shown in the illustration, the switchboard is equipped with the usual answering jacks with lamp signals, but a listening key, connected with the operator's head set, is also placed in each circuit, so that he can answer a call without the delay incidental in putting up a cord. Above the switchboard proper will be noticed a large map, painted on a piece of plate glass, seven feet long by two and one-half feet wide, which shows the streets upon which the car lines are operated.

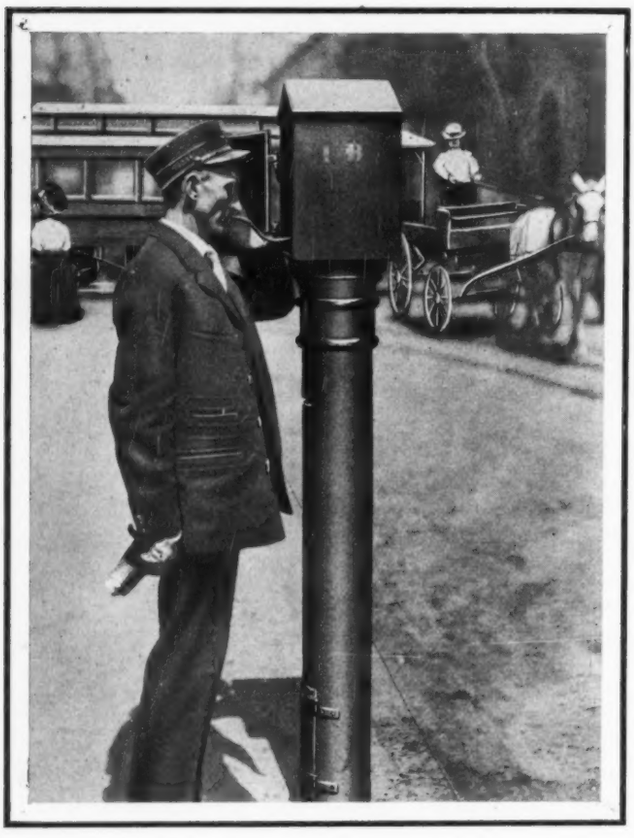
Connected with the switchboard are lines extending to telephone stations, which are installed at intervals along the car lines. These stations are installed in iron boxes similar to those used by the police departments in various cities, and are located at the edge of the sidewalks.

The car starters at the ends of the various divisions are also provided with instruments, connected with the switchboard, so that they may readily reach the dispatcher at the central office.

The street car conductors are all furnished with keys which will unlock any of the telephone boxes, and in case of an accident or unusual delay, such as obstructions caused by fire hose across the street, the conductors have

instructions to immediately call up the dispatcher from the nearest box.

As the telephones used on this system are of the common battery type, signal lamps are illuminated at the switchboard whenever a conductor removes the receiver from the hook. This is not the only signal which the



Electric Railway Conductor Communicating with Headquarters.

switchboard operator receives, however, as a lamp, located on the map at the point on the route from which the call is made, is also illuminated. By this means of double signaling, errors due to a misunderstanding of the box numbers or streets are avoided, and the operator does not have to refer to any printed list for obtaining the location of the station from which the call originates.

The various stations are equipped with loud sounding gongs so that calls can be sent to any station along the line, in case it is necessary to issue orders to any of the cars in transit.

By this means of rapid communication with headquarters, car starters at the ends of the line are immediately notified of any delays or blockades to the system—cars can be detoured from their usual route and sent by some other, thus avoiding the blockade, and other cars can be inserted at proper spaces so that the running schedule of the system is not materially interfered with by any blockade.

As stated before, this system has been in use for about a year and has given excellent satisfaction. The car service has been greatly improved, as the cars are kept running closer to schedule time than ever before. The successful outcome of this experimental installation demonstrates that the telephone has not yet reached its zenith in commercial work.

It is expected that the system will be further developed from time to time by the Chicago City Railway Company, and it is quite probable that after the system has been fully perfected, electric railway companies in other large cities will use similar systems.

An Amplification of the Well Known Rodent Specification.

The tendency toward elaboration in telephone practice seems to be exemplified in the following:

Specification No. 23.—How to prevent rodents from destroying lead cables.

"General.—This specification is intended to set forth a method of preventing squirrels from gnawing the lead sheaths from aerial cables, and while some of the suggestions may seem to be of a frivolous nature, they are presented in good faith and with the expectation that they will be closely followed.

"Method.—It has been suggested that the foreman in charge of the infested district place a man on each pole and instruct him to make a noise like a nut, thus enabling him to coax the squirrel near enough to be caught and killed. But, owing to the scarcity of men, and owing to the fact that several of the men have gone nutty over this scheme, it is not deemed practicable.

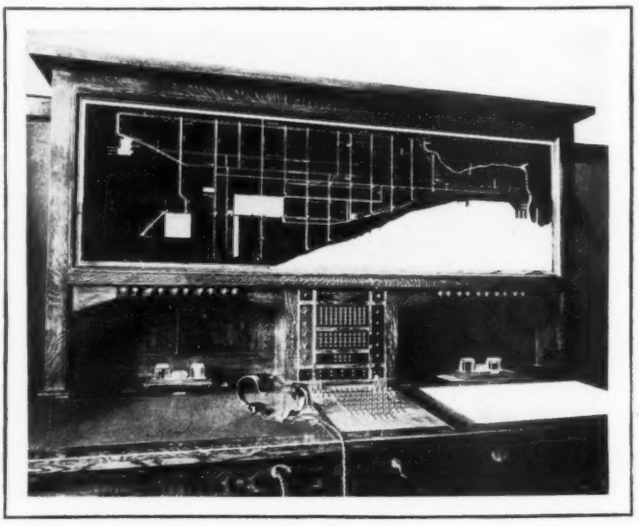
"The best method obtainable at the present time is to hang below each cable hanger a nut of some variety, placing them in the order named: Upon the first hanger, place a peanut, second, a hazelnut; third, a walnut; fourth, a hickory nut; fifth, a butternut, and sixth, a beechnut.

"It is suggested that about every ten feet, two nuts be placed under a hanger. This will cause the squirrels to think that he has suddenly become cross-eyed, and the scare will cause him to lose his foothold and the fall will kill him.

"If he has not been killed by the fall, but is so crippled that he may be caught, grasp him firmly by the back of the neck, tickle his ribs till his mouth opens wide with laughter then fill him full of lead shot, which will cause him to sink, then throw him in a vat of sulphuric acid. This will eat away all the animal matter, and the remaining lead from his system may be sold for junk."—*Exchange.*

The Telephone a Promoter of Peace.

Jenkins—Well, sir, I gave it to that man straight, I can tell you. He is twice as big as I am, too, but I told him exactly what I thought of his rascally conduct right



The Switchboard Used in the Telephone Car Dispatching System of the Chicago City Railway Company.

to his face, and I called him all the names in the dictionary and a lot of others as well.

Studs—And he didn't try to hit you, Jenkins?

Jenkins—No, sir, he didn't. And when he tried to answer back I just hung up the telephone receiver and walked away.—London *Tid Bits.*

Toll Traffic*

By Geo. K. Gann

All traffic principles and studies, both of the past and the future, are necessarily based upon the amount of business, expressed in concrete figures, which has been handled in the past, or which is expected to be handled in the future.

An overloaded position may be the direct cause of poor service complaints, an overloaded toll circuit not only a cause of slow service and consequent dissatisfaction to the patron, but a loss in revenue can be directly traced to it. The knowledge of such a condition can only be obtained intelligently through an actual count of the business; the fault can only be corrected through careful study of the count. The "hit or miss" method is never productive of the best results. The so-called "peg count" frequently proves of great value in even the smallest exchanges, or system; in a large exchange it is an absolute necessity. This being so, it is a condition essential to making the highest profit that one may be able to go into any exchange operated by a local company, and obtain from their records such information as the following:

1. Total number of calls handled in one day.
2. Number of calls per position per day.
3. Total number of calls handled each half hour during a day.
4. Average number of messages per day over each toll circuit.
5. Per cent of lost toll business.
6. A ticket form which will show the interval from filing time to time when first report is given the subscriber, or when connection is established; in other words, the speed of the service.

Counts of the number of calls per position per day, and the number of calls during each half hour of the day should be taken at least once a month. The number of messages per day per circuit should be figured from a total month's business, two or three times a year. The other information should be known each day from a count of the tickets. A form for this purpose is shown in the illustration, and will prove of value as a permanent record.

For the laying out of the operating schedule, switchboard equipment and toll circuits, such counts can be applied to standard operating and circuit loads. These figures can be obtained from a number of authorities, who are generally agreed upon them, and have worked them out at the expense of much thought and experimentation. With little modification they will fit almost any conditions. The following are generally agreed upon as conservative operating loads when no special operating methods are used:

WESTERN TELEPHONE COMPANY

TOLL TRAFFIC REPORT OF_____ OFFICE _____ 190__

GOOD MESSAGES	ANALYSIS OF LOST CALLS																	TOTAL LOST	TOTAL
	BY	DA	DS	KT	LF	NC	ND	NF	NH	OD	U	UD	UN	DUE TO CIRCUITS OD	DUE TO CIRCUITS NOISY	DUE TO POOR TRANS.	MISC.		
SENT																			
RECEIVED																			
THROUGH																			
TOTAL																			

PER CENT OF LOST SENT CALLS_____

PER CENT OF LOST RECEIVED CALLS_____

PER CENT OF LOST THROUGH CALLS_____

PER CENT TOTAL LOST CALLS_____

Summary Form of a Permanent Record for Toll Business.

OUTWARD CALLS.

Over single circuits, 12 calls per hour.
Over one-switch circuits, 10 calls per hour.
Over two-switch circuits, 8 calls per hour.

INWARD CALLS.

Over single circuits, 12 calls per hour.
Over one-switch circuits, 11 calls per hour.
Over two-switch circuits, 10 calls per hour.

It should be borne in mind that these are loads for the average operator, and that it is better to underload than to overload.

Circuit loads generally accepted, except when special operating methods are used, are:

One circuit, 30 mesages per day.
A group of two circuits, 35 messages per day each.
A group of three circuits, 40 messages per day each.

Both operators' and circuit loads must always be considered in connection with the speed of the service. High circuit loads will generally mean slow service, low circuit loads fast service, excepting where other factors may enter

*Abstract of a paper presented at the convention of the Nebraska Independent Telephone Association.

into the question. Neither is to be desired, as one means poor service, the other low earning power.

When thoroughly analyzed, high operating loads in toll work are not usually found to be an economy. High operating loads are generally associated with low circuit loads. The economy of increasing circuit loads rather than operator's loads should be obvious. As an example, an operator at $25 per month for 12 months would cost $300. The annual charges on a mile of No. 10 copper circuit may be taken to be $10, a rather high figure for this territory. It is evident, then, that an operating method which would so increase the circuit loads as to make it unnecessary to string an additional circuit between Lincoln and Beatrice, distance 30 miles, would be economical if it required not more than one additional operator.

The main source of revenue from toll lines being their rental at so much per minute, it is of importance to carefully analyze the circuit time. Circuit time is made up of three factors:

1. The paid time or the time the circuit is in use by the patron.
2. The operating time, or the time the circuit is used by the operators for passing calls, orders, reports and starting conversation.
3. The dead time, or the time the circuit is neither being paid for or used by the operators.

It is evident that an increase in the paid time and a decrease in the operating and dead time must mean an increase in efficiency. The operating time lies largely within control, and can be decreased by preventing unnecessary conversation between operators, use of standard operating methods, use of codes in passing orders and reports, and by improving discipline.

The paid time will increase with the volume of traffic, and with closer attention to the timing of messages. Some device for timing toll messages, as nearly automatic as possible, will generally prove its value at any office originating between $50 and $75 toll business per month. While a mechanical device will not eliminate all error, it certainly will result in a much larger per cent of overtime than can be obtained through observation of an ordinary clock or watch, no matter how careful the operator or how closely watched she may be. It may be interesting to know that the Lincoln office secured 28 per cent overtime in a recent month on three-minute business and 8 per cent on five-minute business.

Upon the half hourly count of the traffic, the operating schedule should be based. It is evident to any one that one certain class of toll calls will require more or less time to handle than some other class. For this reason, in preparing an operating schedule to be based upon the traffic, it is necessary to equate the different classes of calls upon some unit basis. Assuming that an operator can handle 12 single-circuit outward calls (two-ticket method) per hour, we may find from observation and experiment that she can handle only six through calls or relayed through switches, and in like manner with each class of call. Giving to the single-circuit outward call the value of 1 unit, the through call would then be valued at 2 units, and the other classes of calls valued in like manner according to their determined proportion.

The number of operators required to handle the traffic during any particular half hour or hour may then be determined from the simple formula:

$$O = U/L$$

where O is the number of operators required, U the total units of traffic handled during any half hour or hour, and L the number of units the individual average operator is found to be able to handle during any half hour or hour.

Such a method gives an excellent basis to work on, but it is by no means infallible. It must be tempered by local conditions and close observation of the operating force at work on the board. Provision must also be made for relief, and the filling of vacancies and absentees.

The subject of phantom circuits has been given a great deal of attention by all interested in toll circuit lay-outs. A "phantom" or "derived" circuit is made up of two metallic circuits by introducing a repeating coil at each end of each circuit, four coils in all. Ringing and talking can be carried on over the phantom circuit without interfering with service on either of the physical circuits. The introduction of a repeating coil in the physical circuits lowers their talking and ringing efficiency, while the phantom is more efficient than either physical circuit because of the resistance being reduced about half. The two physical circuits composing the phantom must be well balanced or the phantom will be noisy and productive of cross-talk. For this reason, it is necessary to transpose the physical circuits against each other in accordance with a well defined transposition scheme. Because of this necessity for a balance, it is impracticable to phantom an iron and a copper circuit, or two circuits of different gages.

It is well to bear this in mind in planning additions to the toll plant, as it may be more economical in stringing a new circuit to make it copper instead of iron, where a copper circuit already exists, in order to be able to obtain a phantom. For the best results, the two circuits to be phantomed should be on adjacent pins of the same cross arm, and neither should be on the pole pins.

As a slight trouble on either physical circuit will generally throw the phantom out of service, even though it is possible to use the physical circuit commercially, the phantom cannot be considered as reliable as a physical circuit. For this reason also a high degree of maintenance is required. It must also be remembered that the introduction of repeating coils in the physical circuits lowers their ringing efficiency, and trouble is likely to result from this source. Because of the perfect balance required between the physical circuits, it is also impracticable to cut in intermediate stations on either physical circuit.

If properly planned, phantom circuits will result in great saving in the cost of the wire plant with consequent greater efficiency and earning power. The Western Telephone Company now has 272 miles of phantom circuits in service which they estimate cost a total of $1,323. To duplicate these phantoms with physical circuits would cost $18,740, so that a saving of $17,417 is due to the use of phantom circuits.

Proper routing instructions and their correct interpretation by the operating forces has become a necessity with the growth of a toll plant. In an endeavor to temporarily supply such instructions to the Lincoln operating forces, until such time as a standard route book can be completed, some of the rate books, with a printed list of stations, were ruled with three columns to the page. These columns were headed, "1st, 2d and 3d routes", respectively. A flyleaf was inserted in the front of the book and on it were listed, in alphabetical order, all points that could be rung direct, and each of these points given a number. The proper routing for each point listed in the rate book was determined, and numbers referring to the list of "Direct points," placed after it in the proper columns. As can be seen, this gives the operator the name of the first switching point to ring in routing any call, which in the large majority of cases is all that is necessary. Numbers instead of names were used to designate the switching points in order to include the three routes in the limited space afforded by the Rate Book.

Routes to any point were assigned with the following in mind:

A. The "First route" is the normal and proper routing for the traffic.

B. The "Second route" is one that involves very little more circuit mileage than the first route and not more than one additional switch. The instructions to our operators say that the second route may be used when "The first route is in trouble, or a call is delayed for more than five minutes, due to the first route being busy."

C. The "Third route" is an emergency route to be used only in case of a complete failure of both the first and second routes. It is usually very roundabout, and, in fact, the circuits comprising it should follow entirely different pole lines from those comprising the first and second routes.

Where there are two or more circuits of different character between any two points, it is important that the character of each be marked on the designation strips, and the operators instructed as to their proper use for through or long haul business. Such a distinction will frequently make the difference between good and poor transmission on through business. The various circuits should be given preference in the following order:

1. Phantom circuit.
2. Through copper circuit.
3. Local copper circuit.
4. Through iron circuit.
5. Local iron circuit.

By a "through" circuit is meant one of large gage wire, or without any intermediate stations between the terminals, as distinguished from a "local" circuit of small gage wire or with one or more intermediate stations between the terminals.

The necessity for attaining a high standard of maintenance on toll lines is generally recognized by the larger companies. Some of the smaller companies, perhaps through an idea that their short lines were not of much importance, failed to see this necessity, and in consequence the public gained an impression of unreliable service. When their toll line maintenance was brought more closely to the attention of these latter companies, and followed up day by day, they began to appreciate that all were interested equally, and the improvement has been very noticeable. The State Wire Chief plan, as worked out by your Traffic Committee, may be credited with at least this result so far, although it has not been in operation long enough to give any definite figures.

The rental of its circuits at so much per minute being the principal source of any toll line company's revenue, it is surprising what hazy ideas its employees, particularly those in the maintenance department, have of their relative earning value. The earning value per hour of each circuit terminating in his office should form an important part of the wire chief's records. Not having any absolute figures, it frequently happens that in case of two circuits being in trouble, and it being necessary to exercise a preference, the less valuable circuit is first cleared. Or the wire chief will spend two dollars to save an hour's time in clearing trouble on a circuit whose earning value is but 20 cents an hour.

The three principal factors determining the actual earnings of a circuit are the rate per mile, the number of messages carried and the length of the circuit. Other factors would have to be considered were it desired to determine the exact value without error, but for the purpose of judging the comparative value of two or more circuits, the following simple formula may be depended upon to give good approximate results:

$$V=\frac{M\ (L\times R)}{H}$$

Where V = value in cents per hour of circuit.
Where M = average number of messages per day carried by circuit.
Where L = length of circuit in miles.
Where R = rate in cents per mile for initial period.
Where H = number of hours in telephone day, generally about 13.

To take a concrete example, the circuit distance between Lincoln and Seward is 30 miles, the rate per mile for the initial period $.0075, the number of messages per day 40 and the length of the telephone day 13 hours. Applying the formula for the value of V:

$$V=\frac{40\ (30\text{x}\$.0075)}{13}=\$.69$$

While there are many conditions existing which will tend to falsify this formula, its application will generally serve to give definite figures, where before there was nothing but guess work.

Telephone Directory Aids Father in Locating Son.

The telephone has been put to many useful advantages, and now comes a story showing the usefulness of its most valuable adjunct, the telephone directory. In 1887, Walter D. Ross, after the death of his wife in England, came to the United States, leaving his two sons in the care of friends. When he wrote to his friends he received no reply and after years of diligent search for some trace of the boys was informed that they were dead.

Recently, Mr. Ross, who is in the employ of the Flint Wagon Works at Flint, Mich., had occasion to call up a friend. Having forgotten the telephone number, he found it necessary to refer to the directory. On picking up the book, it accidentally opened at the "R's" and practically the first name to attract the attention of Mr. Ross, was that of Coleman J. Ross, superintendent of the Weston-Mott Motor Company at Flint. As that was the name of his older son, Mr. Ross called up the number with a wild hope that possibly he had located his son, long believed to be dead. To his great surprise and joy, his hopes were realized and he found not only a son but a grandchild also. It appears that father and son had lived within a mile of each other for the past three years when the younger Mr. Ross moved from Utica, N. Y., to Flint. The father was also informed that his younger son was still alive, both boys having lived together in Utica for years. Thus again has the telephone come to the front and demonstrated that its usefulness is not confined to the ordinary but often to the extraordinary.

The Telephone Spanning the Saskatchewan River.

Stretching for a span of 900 feet across the Saskatchewan River is the telephone communication between Edmonton and Strathcona, Canada. Four towers, two on the Strathcona side and two on the north side, near the foot of Fourth street, stand like the giant piers of a railway bridge. The telephone cable runs horizontally across the river, and is midway between the towers. The support of the cable is secured by suspension cables from the top of the towers. As these swing out over the river and above the telephone cable they are drawn together midway and form a tangent. This scheme was devised by Mr. Higman, the construction engineer, to reduce the sway of the cable to a minimum.

The towers on the Strathcona side are 52 feet 6 inches in height and those on the Edmonton side 35 feet. Each tower is anchored in the rear by a rod buried to a depth of eleven feet in concrete. Each rod is able to bear a strain of 18,000 pounds.

The present suspension cable has taken the place of the temporary cables across the river, and since the permanent connection between the two cities, the service, by reason of a large number of circuits, has given great satisfaction.

Specifications for Hard-Drawn Copper Wire

At the annual meeting of the American Society for Testing Materials, held in Atlantic City, N. J., June 29 to July 3, 1909, Committee W presented proposed standard specifications for hard-drawn copper wire, including round wire, grooved trolley wire and cable or standard wire. These specifications were received without discussion and ordered submitted to letter ballot for adoption by the society. The result of this ballot has not yet been announced. The committee which prepared the specifications consisted of the following:

J. A. Clapp, General Electric Company, chairman; W. H. Bassett, American Brass Company; J. F. Finley, American Steel & Wire Company; H. J. Horn, John A. Roebling's Sons Company; C. C. Baldwin, Standard Underground Cable Company; O. A. Havill, Viele, Blackwell & Buck; F. W. Wallace, Waclark Wire Company; C. Crosland, Western Electric Company; T. D. Lynch, Westinghouse Electric & Manufacturing Company; C. D. Gray, J. G. White & Company.

The text of the specifications as presented and the explanatory notes of the committee are reprinted in full below, with the exception of grooved trolley wire specifications:

PROPOSED STANDARD SPECIFICATIONS FOR HARD-DRAWN COPPER WIRE.

1. The material shall be copper of such quality and purity that, when drawn hard, it shall have the properties and characteristics herein required.

2. These specifications cover hard-drawn round wire, grooved trolley wire and hard-drawn cable or strand, as hereinafter described.

3. The wire, in all shapes, must be free from all surface imperfections not consistent with the best commercial practice.

4. (a) Package sizes for round wire and for cable shall be agreed upon in the placing of individual orders; standard packages of grooved trolley wire shall be shipments upon reels holding about 2,500 lbs. each.

(b) The wire shall be protected against damage in ordinary handling and shipping.

5. For the purpose of calculating weights, cross-sections, etc., the specific gravity of copper shall be taken as 8.90.

6. All testing and inspection shall be made at the place of manufacture. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to enable him to satisfy himself that the material conforms to the requirements of these specifications.

HARD-DRAWN ROUND WIRE.

7. (a) Size shall be expressed as the diameter of the wire in decimal fractions of an inch, using not more than three places of decimals; i. e., in mils.

(b) Wire is expected to be accurate in diameter; permissible variations from nominal diameter shall be:

For wire 0.100 in. in diameter and larger, 1 per cent over or under.

For wire less than 0.100 in diameter, 1 mil over or under.

(c) Each coil is to be gaged at three places, one near each end, and one approximately at the middle; the coil may be rejected if, two points being within the accepted limits, the third point is off gage more than 2 per cent in the case of wire 0.064 in. in diameter and larger, or more than 3 per cent in the case of wire less than 0.064 in. in diameter.

8. The wire shall be so drawn that its tensile strength and elongation shall be at least equal to the values stated in the following table. Tensile tests shall be made upon fair samples, and the elongation shall be determined as the permanent increase in length, due to the breaking of the wire in tension, measured between bench marks placed upon the wire originally 10 in. apart. The fracture shall be between the bench marks, and not closer than 1 in. to either mark. If upon testing a sample from any coil of wire, the results are found to be below the values stated in the table, tests upon two additional samples shall be made, and the average of the three tests shall determine acceptance or rejection of the coil.

Diameter, inches	Area, circular mils	Tensile strength, lbs. per sq. in.	Elongation in 10 in. per cent
0.460	211,600	49,000	2.7
0.365	133,200	53,000	2.4
0.325	105,600	54,500	2.3
0.289	83,520	56,000	2.1
0.258	66,560	57,500	2.0
0.229	52,440	58,500	1.9
0.204	41,620	59,500	1.8
0.182	33,120	60,500	1.7
0.162	26,240	61,500	1.6
0.144	20,740	62,500	1.5
0.128	16,380	63,400	1.4
0.114	12,996	64,200	1.3
0.102	10,404	64,800	1.2
0.091	8,281	65,400	1.1
0.081	6,561	65,700	1.0
0.072	5,184	66,000	0.9
0.064	4,096	66,200	0.9
0.057	3,249	66,400	0.8
0.051	2,601	66,600	0.8
0.045	2,025	66,800	0.7
0.040	1,600	67,000	0.7

For wire whose nominal diameter is between listed sizes, the requirements shall be those of the next larger size included in the table.

9. Electric conductivity shall be determined upon fair samples by resistance measurements at a temperature of 20 deg. C. (68 deg. F.). The wire shall not exceed the following limits:

For diameters 0.460 in. to 0.325 in., 900.77 lb. per mile-ohm at 20 deg. C.

For diameters 0.324 in. to 0.040 in., 910.15 lb. per mile-ohm at 20 deg. C.

HARD-DRAWN COPPER WIRE CABLE OR STRAND

14. For the purposes of these specifications, standard cable shall be that made up of hard-drawn wire laid concentrically about a hard-drawn wire center. Cable laid up about a hemp center or about a soft wire core is to be subject to special specifications to be agreed upon in individual cases.

15. The wire entering into the construction of stranded cable shall, before stranding, meet all the requirements of round wire, hereinbefore stated.

16. The tensile strength of standard cable shall be at least 90 per cent of the total strength required of the wires forming the cable.

17. Brazes, made in accordance with the best commercial practice, will be permitted in wire entering into cable; but no two brazes in wire in the cable may be closer together than 50 ft.

18. The pitch of standard cable shall be not less than 12, nor more than 16, diameters of the cable. The cable shall be

laid left-handed or right-handed, as shall be agreed upon in the placing of individual orders.

EXPLANATORY NOTES ON PROPOSED SPECIFICATIONS FOR HARD-DRAWN COPPER WIRE.

5. The specific gravity of copper has been commonly accepted as 8.9, and this value is retained in the proposed specifications. The maximum variation from this figure in a large number of samples of wire has not been sufficient to lead one to anticipate any serious error from its use as a flat value in calculations.

7. (a) The use of arbitrary gage numbers to express dimensions cannot be too strongly condemned. There are many such gages in existence, and confusion is to be expected unless the particular gage to be used is specified. Many of the gages have their dimensions stated in absurd figures, such as 0.090742 in., when it is not especially easy to measure dimensions in the fourth decimal placed by workshop tools. Definite diameters in measurable units are evidently preferable.

8. Many other physical tests than those provided in these specifications are included in existing specifications. The reasons for the omission of some of the more common are given as follows:

Twist Tests.—The wire is sometimes required to permit twisting through a stated number of revolutions before breaking. The results are so easily influenced by temperature, speed of rotation, method of gripping and other variables not easily defined or controlled, that the test is at least of doubtful value. It is the opinion of the committee that it is impractical to so define the conditions of the test that a twist test can be made definite and reliable: hence there is no warrant for its inclusion in specifications.

Wrap Tests.—Wire is sometimes required to permit tight wrapping about a wire of its own diameter, unwrapping and again rewrapping. It is obvious that the making of a test of this kind with wire that is already hard-drawn is exceedingly difficult. Every one who has tried to break off a piece of tough wire by bending it back and forth between the fingers knows how hard it is to confine the bend to one place, because of the hardening action of the previous bends. Hard wire which has been wrapped around a wire of small diameter is hardened still more and it is almost impossible to straighten the wire, let alone recoil it in the opposite direction. In the opinion of the committee it is inadvisable to include a test which at best is so indefinite as a wrap test. Furthermore, it is the opinion of the committee that wire which will meet the physical tests included in the proposed specifications will meet any properly made twist or wrap test that would reasonably be required.

Elastic Limit.—During the tension test on wire there is seldom to be observed any definite drop of the beam or increase in the rate of elongation, corresponding to the yield point commonly observed in testing steel. The only way in which the elastic limit of hard wire may be determined is by the actual plotting of the elastic curve from extensometer readings. Even such tests are difficult of interpretation, because the wire when available for tests is usually curved, due to its having been put up in a coil. There are little sets observable before the true elastic limit has been reached, owing to the fact that one side of the wire, having been stretched in coiling, is really a little harder than the other side, and the pull is, therefore, not even. Considering the difficulty of making the test and the uncertainty of the results obtained, it is the opinion of the committee that it would be inadvisable to include an elastic-limit test in the proposed specifications. It is evident that if the designing engineer requires a knowledge of the location of the elastic limit for purposes of calculation in designing, such data can be obtained by special tests on representative sizes of wire, which will fix the relation of the elastic limit to the ultimate strength for all wire which is properly made.

Elongation.—Elongation tests on wire are required in different specifications to be measured in lengths varying from 8 to 60 in. The elongation has variously been measured as the permanent increase in the length of the wire, measured between bench marks placed on the wire before fracture; as the elongation measured between the jaws of the testing machine, which are adjusted to grip the wire with a certain definite free length, and in various other ways. Perhaps the most commonly used length is 10 in., and it is a good length, because measurements may be immediately transposed into percentages without laborious calculation. Measurement of elongation in any other way than as the permanent increase in length between bench marks, in the manner customary in the measurement of steel elongation of specimens, is open to criticism. If measurements are made between the jaws of the testing machine there is included a certain amount of elongation which has taken place within the jaws, because the wire in stretching will have been reduced in diameter and, therefore, have stretched to a greater or less extent within the jaws themselves. If the measurement is made between bench marks on the wire just prior to breakage, there is included in the elongation a certain amount of elastic deformation.

9. Electric conductivity is usually expressed as a percentage on the Matthiesen basis, reference being made to determinations of the electrical resistivity of supposedly pure copper by Matthiesen about 1865. Since that time the methods of refining copper have greatly improved, so that to-day it is not uncommon to find copper of over 100 per cent conductivity on the Matthiesen basis. Furthermore, what the electrical engineer requires is that the wire shall not exceed a certain maximum electrical resistance. It seems obvious that it is less laborious to express quantities in direct definite terms rather than by reference to something else which requires interpretation before the results are ready for use in calculation. Resistivity is commonly expressed in a number of different ways, all being equivalent to the resistance of some unit of cross-section, this unit being expressed either in linear dimensions or as a combination of weight and dimensions. For convenience we give a table of equivalents of the values for electrical resistance included in the proposed specifications. The values are equivalent respectively to 97 per cent and 96 per cent conductivity on the Matthiesen basis:

900.77 lb. per mile-ohm is equal to:
0.15776 ohms per meter-gram,
1.7726 microhms per centimeter cube,
0.69789 microhms per inch-cube,
10.663 ohms per mil-foot.

910.15 lb. per mile-ohm is equal to:
0.15941 ohms per meter-gram,
1.7911 microhms per centimeter-cube,
0.70517 microhms per inch-cube,
10.774 ohms per mil-foot.

10. It is obvious that the simplest designation of irregular shapes of similar outline is by sectional area, and the most commonly used unit among electrical engineers is the circular mil. Therefore, while the sizes of grooved trolley wire regularly used are generally known by B. & S. gage number, corresponding to their sectional area, it has been deemed advisable by the committee to list these sizes, in specifications, by their sectional area expressed in circular mils. The three sizes which are most extensively used commercially are the only ones listed; a fourth size is but little used, and the use is growing less.

11. The only way in which gage variations are easily determinable in irregular shapes is by recourse to weights of standard lengths, and this has been the method adopted in the specifications.

14. So many variations in the construction of cable are possible that it has been deemed inadvisable to complicate the

specifications by including requirements for any other than the one type most commonly used.

16. Physical testing of cable is at best a difficult matter, and the measurement of elongation in cable which has been subjected to a tensile test is uncertain, since it includes both the elastic deformation of the cable as a spring, the actual elongation of the wires, and perhaps even some elastic deformation of the wires as such. It is therefore thought inadvisable to include a requirement covering an elongation test.

17. The permitting of brazes in wire entering into the construction of copper cable was discussed at considerable length, and it is finally the opinion of the committee that, provided no two brazes are closer together than 50 ft., the cable has fully 90 per cent of the theoretical strength obtained by adding together the required strengths of the constituent wires. This is due, in such long lengths, to the frictional gripping of the wires in the cable. The construction of long lengths of cable without brazes is costly, and it has been thought best, therefore, to permit their use, provided they are sufficiently widely spaced as not to be detrimental to the cable's strength.

Selective Lockout Telephones.*

By Charles E. Hollander.

This subject has been argued pro and con among telephone managers until it is nearly worn threadbare. Some claim that the increased maintenance entirely prohibits the use of lockouts, and others that the benefits derived overbalance such expenditures. Undoubtedly the maintenance charges are augmented by the increased equipment necessary, but with an additional charge for rental this can be more than overcome; for it is an undeniable fact that such service is worth far more than the ordinary "ring all, butt in" telephone. The selective feature of the instrument is of greater importance, while the lockout is of minor, but the combination of these two functions makes it possiple to give the subscriber as near an individual circuit as possible. It will be found that the lockout feature, though seldom used, makes a most favorable impression upon the prospective subscriber and often is the final argument necessary to induce him to take a telephone.

The term lockout itself is undoubtedly a strong talking point. It will be found, however, that in those instruments which lock out only when the subscriber is called, and not when he is calling, the percentage of calls in which the subscriber asks to be selected (and this is the means by which others are locked out) will not exceed 25 per cent. After the instrument is installed it is some time before the uninitiated patron will learn that to have the line to himself he must ask the operator after giving in his call to ring him back and then hang up his receiver and wait for the ring.

Some subscribers, after seeing the troubleman repair their instrument, become imbued with the idea that they can do it just as well and out of the kindness of their generous hearts will start in to do so, in order to save the inspector a long trip from the exchange. To prevent this trouble, for trouble it is sure to be, it is well to have all lockout devices equipped with a seal of some sort; not merely one which shows that the instrument has been tampered with, but one which really does seal the telephone. Even though the lockout instrument does give more trouble than some others, still it is a blessing to the telephone manager in many respects. True, he has more complaints in regard to the telephone itself, but he never hears that Mrs. Robinson listened to every word that Mrs. Brown was saying and told it broadcast over the neighborhood; he never has any disputes to settle between neighbors, nor do the neighbors themselves change from warm friends to bitterest enemies; he never hears of old ladies sitting in comfortable rocking chairs and quietly knitting, with the receiver tied to the back of the chair.

Let us make a comparison between the service furnished by the non-selective instrument and that which we have under discussion. The operator on the non-selective bridging system rings out on the line for a given subscriber, and what happens? Every house on the line resounds with the ring of the tantalizing telephone bell. Every housewife (and they are probably all at home) hears it and stops what she is doing to listen. How few of them are lacking in curiosity, how many of them will rush forward in a perfect agony lest they miss the last word, grab the receiver from the hook and clasp it to their ear and hear things which oftentimes they wish they had not heard? There are thousands of people who, though they never would think of opening letters belonging to others, never hesitate to listen to a telephone conversation

Now, with the selective telephone, the operator selects out on the line, the bell rings for the party wanted and for only him, and all others are locked off, each telephone showing a busy signal. The other subscribers on the line may take off the receiver, but no sound can be heard. Among other advantages of the lockout system is the fact that the operator has full control of the line at all times; it is impossible for a subscriber to tie up the whole line by simply leaving the receiver off the hook; and should there be a time limit imposed, then the operator can gain possession of the line by simply selecting on it. The time limit in itself amounts to something with people on the same line in that it can be enforced.

In securing subscribers it is often necessary to overcome the objection of paying more rental for service than our competitors are charging. Such conditions may be overcome by many arguments, the first always being, of course, that of far superior service. Where a competitor uses four selections, as the Bell company is doing in many places, with four stations on each selection, this makes a total of sixteen telephones to a line. Now, if the charge is $1.25 per month per instrument, then the total rental of the line will amount to $20; while, with ten stations on a line, at $1.50, the Independent company's line would bring in only $15 per month. So it can readily be seen that the Bell company is really getting more money with a less investment and an inferior service. When the farmer can be made to see it in this light, he very quickly decides which he prefers.

Not long ago a "chronic kicker" made a call on a certain telephone manager in order to pull off his usual stunt of trying to obtain a reduction, this being settlement day. He told of many troubles, some real and some on their face purely imaginary. When he had finished, the manager, who had listened quietly to his long list of woes, remarked that he had heard that two or three people out his way had had some trouble. "Oh, yes," said Mr. Kicker, "nearly everyone is having trouble." "Well," said the manager, "I'll tell you what we'll do. We will go about and get the consent of all the people on the line and take out the lockout telephones and put you in some of those telephones that they are using over in Blankville. They ring everybody, and you can hear everything that's going on all up and down the line. We can afford to give you such telephones for 25 cents less a month. Now, I'll draw up the paper and you sign it first." "No, I think not," was the reply. "We'll put up with a little extra trouble and get along with the lockout telephone." And since that time his bill has always been paid promptly and without question.

This seems to be the consensus of opinion among the rural subscribers who have had any experience with the selective lockout telephone—that they would rather have a little more trouble and a little more expense and do away with the many rings—particularly late at night—and the constant eavesdropping and wrangling.

*Abstract of a paper read at the Ohio Convention.

Central Office Locations*

By S. D. Levings

The portions of the plant to be compared, together with the figures upon which to base the comparisons, have now been described, and the next step will be to explain the methods to be used in planning the theoretical lay-outs, upon the results of which the cost comparisons to determine the most economical plan will be made.

In considering the annual charges for comparison purposes, for any particular arrangement of districts and central offices, the amounts of the various portions of the plant upon which to base the annual charges must be first calculated. There are three fixed charges, in addition to the plant to be calculated, and these charges, together with the plant items, are found in the following table:

1. Subscribers' mileage.
2. "A" position equipment.
3. Trunk mileage.
4. "B" position equipment.
5. Toll switching trunk mileage.
6. Toll switching trunk switchboard equipment.
7. Multiple jack equipment.
8. Central office apparatus constant.
9. Rent.
10. Central office labor charges.

The annual charges on the above are proportional to the number of offices, in some instances, and to the arranegment of the districts in others. The theoretical studies to be made for comparison purposes cannot be efficiently made until the relation between the above-listed items and the central offices and districts are known. For this reason, the following is presented for the purpose of defining and describing the relations that these several items bear to the plant as a whole:

1. Subscribers' mileage, varies inversely as to the number of offices.
2. "A" position equipment, varies directly as the number of offices.
3. Trunk mileage, varies directly as the number of offices.
4. "B" positon equipment, varies directly as the number of offices.
5. Toll switching trunk mileage, varies directly as the number of offices.
6. Toll switching trunk switchboard equipment, varies directly as the number of offices.
7. Multiple jack equipment, varies directly as the number of switchboards.
8. Central office apparatus constant, varies directly as the number of offices.
9. Rent, varies directly as the number of offices.
10. Central office labor charge, varies directly as the number of offices.

To summarize the work completed thus far, it is found that the basis for cost comparison, namely, the annual charge, has been defined; the items of plant and fixed charges which are to be considered have been defined, together with their relations to the plant as a whole. The uext work to be taken up is the method to be used in designing the theoretical arrangement of districts and offices, followed by the methods for designing the plant as a whole upon which to calculate the annual charges.

In general, there are two types of multi-office territories to be considered which are frequently met with in actual practice, and which are defined according to the location of the business district. As the business district in commercial life is, so to speak, the hub of the wheel, so it is in the telephone buiness, both from the financial as well as the construction standpoint. The telephone in the residence is a convenience, while in the business office it has become a necessity. From this reasoning the business district has always demanded first attention in designing the plant, as well as constructing and maintaining it. That the business district location influences the design of districts and plant will become apparent presently. One of the types of towns, referred to in preceding discussion, is that in which the business district is markedly at one side of the territory. This type will usually be found in towns bordering navigable waters, the commerce resulting from their being so geographically located tending to draw the business district toward the water front. A very striking example of this type is found in the city of Chicago, and an outline map of the city, with the business district in the shaded portion, as shown in Fig. 22, clearly indicates the characteristics of the first type to be considered. The second and remaining type, which is most frequently encountered, is, as shown in Fig. 23, one in which the business district is approximately centrally located. Considering these two types, as affecting the central office arrangement upon which the districting is based, it is found that there is a marked variation in the theoretical design. If it is true that the business district is to be considered as the hub of the wheel, it is most natural to assume that the greatest telephone density will center as closely as possible around the business district. In the case of a town of the first type, it is impossible for the distribution to center around the business district, so it does the next best thing, and spreads out along the water front and toward the geographical center of the city. The theoretical arrangement of the central office system for a town of this type is shown in Fig. 22,

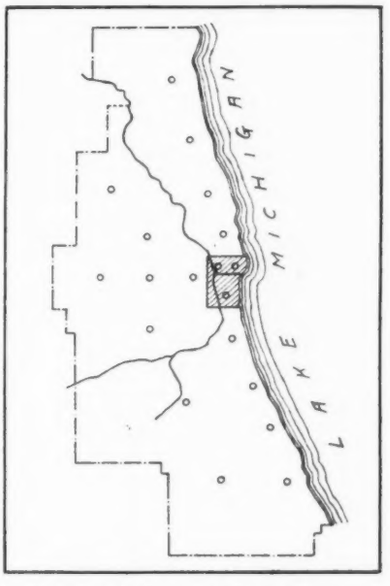


Fig. 22. Outline Map of Chicago, Illustrating Type of City Where Business District Is on One Side.

*Continued from issue of September 4, 1909.

the central offices being represented by the small circles. In the second type of town, where the distribution has an opportunity to spread about the business district on all sides, and approximately in the same amount in each direction, a theoretical arrangement of the central office system is shown in Fig. 23. In this manner the theoretical

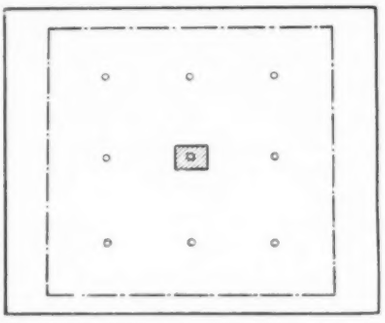


Fig. 23. Type of City with Business District Centrally Located.

office system is initially designed. When the theoretical design is completed, the changes necessary, based upon a further determination for location along more practical lines, will become apparent. But as a basis upon which to begin the study the town may be considered with the two types just mentioned in view, and the design made along the lines indicated in the diagrams. A rule for theoretically obtaining the number of offices for a given number of lines has been previously cited, and the relationship between the number of lines to be served from a single exchange and the area thus served has been noted. From these rules, coupled with the rule for the allowable maximum for subscribers' No. 22 gage cable, the distance between exchanges can be computed. This is but another way of determining the number of exchanges. Upon the rule that not more than two miles of No. 22 gage cable is allowable on either side of the exchange in a multi-office district, the result is obtained that the exchanges can be approximately three miles apart for the maximum distance. Three-mile centers, then, form the refined basis for the theoretical office system design.

The business district being considered as the theoretical and practical distribution center, it is logical to start the design for the central office system from this area. From an inspection of the ultimate development figures upon one of the maps to be used for this work, located in the business district, it will be possible to select a central office location approximately at the central point of greatest density. Assuming that the districts are to be square, lay out the system on the basis of three miles between offices, in the theoretical positions for the particular type of town, as previously referred to in Figs. 22 and 23. When these locations have been established, the boundaries of the various districts are to be selected and located in the streets which come the nearest to bisecting the area between the adjacent offices. These boundary lines should be drawn in with colored pencil, so as to be readily distinguishable. When this is done, the theoretical districts, with their theoretical office locations, have been determined.

In order to make sure that the ultimate capacity of the switchboard in any dstrict, i. e., 10,000 lines, has not been exceeded, by thus districting the territory, the next step will be to check the line figures in each district. Ultimate lines only, of course, are to be considered in this work, and a total of these in each district should be taken, beginning with the business district. If the result, in the case of the business district, indicates that the maximum capacity has been exceeded, steps must be taken to reduce the size of the district to make it include only a proper number of ultimate lines. This is done by reducing the boundaries on all sides by equal amounts if possible, so as to keep the district in the form of a square, and to such an extent as to exclude the proper number of ultimate lines, thus leaving a total within the boundaries which will not exceed 10,000. Where it becomes necessary to move the boundary lines to reduce the number of lines, it will be found that the areas of the adjoining districts have been increased by the distance the boundary lines were moved. To compensate for this increase, the remaining boundary lines of the adjoining districts affected should be so decreased as to restore the original area to them. Succeeding the check on the business district, the adjoining districts should be treated in the same way, and the boundary lines adjusted so as to enclose the proper number of ultimate lines.

Where it is found that the ultimate lines in any district do not equal 10,000, the boundaries are not to be extended, as they were originally placed to allow of the maximum amount of subscribers' No. 22 gage cable. By the above method the boundary lines can be thoroughly checked, and the next step is to check the theoretical office locations, selected by the mileage method, by locating them, using the telephonic center method.

In prosecuting this work, the methods to be followed are as previously described for single office towns, and the rectangular method of measuring is to be adhered to for the present. Each district should be considered as a unit, and the office location for each district, when determined, should be designated by a red cross. When the proper office location has been determined by the above methods, the plant design is ready to be taken up.

The following rules are for the purpose of determining the extent of the various portions of the plant, and not their size. The No. 22 gage subscribers' cable plant for each district is to be considered first. As in the former cases, for districting and locating the central offices a theoretical design of cable plant is to be made, upon which the amount of plant is to be calculated. This theoretical design of the subscribers' cable plant is shown in Fig. 24. One of the intersecting streets at which the office is located is to be selected for the main cable lead. It is immaterial which one is taken, if the district is square, but if this is not the case, the longest street should be selected. The districts in Fig. 24 are assumed to be square, and the main cable leads for the districts are shown

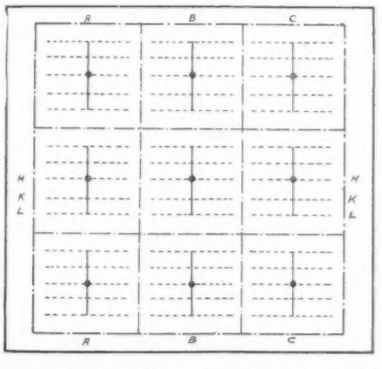


Fig. 24. Theoretical Design of Subscribers' Cable Plant.

at *A-A*, *B-B* and *C-C*. The branch, or feeder cables, which join the main cables, are to be laid out in the street upon which the office is located and which intersects the main cable lead, and upon every fourth street in both directions to the edge of the district. The branch cables in Fig. 24

are indicated by the dash lines at *H-H*, *K-K*, etc. When this work is complete the theoretical subscribers' cable plant, in its extent and location, has been designed.

Following the plan for the subscribers' cable plant, the theoretical trunk cable plant is to be designed. It has been explained previously that the trunk wires are for the

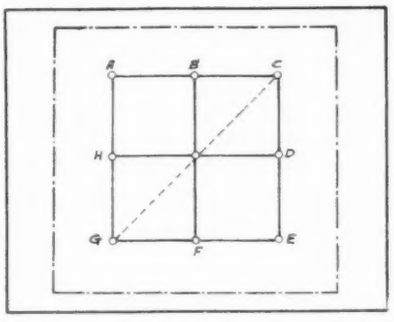


Fig. 25. Theoretical Layout of Trunk Cable Plant.

purpose of connecting each exchange or central office with every other central office. In order that the trunk plant may be an economical one, this result must be accomplished with a minimum length of No. 19 gage trunk cable. Where the districts are square or rectangular, and no through diagonal streets exist either in a part or the whole of the territory, the trunk cable leads will be laid out as shown in Fig. 25, represented by the solid lines, in order to fulfill their requirements. Minimum trunk cable length is desired, and as the street routes must necessarily form the paths they are to take, the streets which will give the minimum distance, according to the requirements of the definition, should be selected. Thus diagonal routes should be selected in preference to right-angle routes, where a saving in trunk mileage between any two offices can be effected, provided, however, that no other distances between offices are increased. The dotted line in Fig. 25 represents an ideal condition involving a diagonal street. A diagonal street will not affect the number of trunk paths necessary, but it will reduce the trunk mileage between two or more offices to an appreciable extent. Thus it is seen that the cables in Fig. 25, from office *G* to office *C*, would, by the absence of the diagonal street assumed for the present to connect them, traverse the path from *G* to *E* and thence to *C*. As the hypothenuse of a triangle is less than the sum of the other two sides, geometric proof is available in favor of the diagonal street. Not only would the trunk path between offices *G* and *C* be shortened in this plan, but offices *B*, *F* and *O* would also be connected by a shorter path. Before laying out the trunk cable paths in accordance with the rectangular scheme, the map should be carefully studied to ascertain the presence of diagonal streets, the use of which would shorten any of the trunk paths, and at the same time not lengthen others so much as to affect the advantage. It many times occurs that the trunk paths lie in the same streets as the subscribers' cable for short distances, and where such is the case room should be provided for two lines in the space reserved for the street. Some colored pencil should be used to designate the extent and location of the trunk plant that will be readily distinguishable from boundary lines and cables.

(To be continued.)

Experiences of the Readers

"Can't Call Central" in the Morning.

A great many telephone men have had this trouble, but possibly there are some of the readers of TELEPHONY who have never been up against just this kind of difficulty. Some trouble men would argue that if the subscriber can call Central one time of the day he could at any other time, and still others would say, "Oh, its only slow service in the early morning before the full force of operators are at their places." The writer has had occasion to look up some of these troubles, and has always found a loose connection, such as a loose fuse, loose wire under screw and washer, solder broken loose, or bad jumper connection to be the cause. It seems after ringing current was sent over the line in the morning, the line would close up, but would open again if not used frequently.

Cedar Rapids, Iowa. Geo. A. Bishton,
Wire Chief, Cedar Rapids & Marion Tel. Co.

Simple Plan for Locating Switchboard Multiple Faults.

The writer has read, with considerable interest in TELEPHONY'S columns, of several different methods for locating trouble in multiple switchboards.

Some of the methods for locating trouble in multiple jacks are rather complicated for ordinary jack trouble. Loose connections, due to imperfect soldering, crosses due to the displacement of small particles of solder; the shifting of the jack springs, or small filings in the bushings of the jacks are the chief sources of trouble with which the writer has to contend. Bearing in mind, therefore, that the average cross in a switchboard jack is of an imperfect nature, i. e., one whose resistance can easily be changed by disturbing the jack wherein the trouble is located, then one can readily understand how efficient the following method proves.

Take, for instance, a cross between the ring and sleeve. A head receiver and a cell or two of battery are cut in series with the ring and sleeve of a cord fitted with a plug that corresponds to the jacks.

The plug is then inserted in one of the multiple jacks, and a number of raps are given with a screwdriver on the part of the plug which projects from the switchboard. If the trouble is not in this particular jack under test, then no variation of current will be produced in the coils of the receiver. The plug is then shifted to the next jack, and when the jack which is in trouble is reached then the raps on the end of the plug will disturb the imperfect cross. This will of course, produce a variation of current in the receiver. A loose connection can easily be located by this method, provided a circuit be formed through battery, cord, plug, receiver and loose connection by means of a cross placed at the intermediate frame on the proper wires.

Hannibal, Mo. John B. Doolittle.

Trouble Caused by Poor Connection Over Railroad Track.

No doubt all maintenance men have troubles to clear, and when we do clear a "puzzler" we profit by it. Recently I had a case at one of my exchanges which bothered me quite a great deal. Early in the morning this particular line would work O. K.—transmission and signaling being fine. But in a short time the transmission would be poor, chopping the conversation all to pieces. By noon the line would be clear out of order and remain so for the rest of the day. The trouble, of course, was a poor con-

nection somewhere, but after examing all contacts I could not find it. This circuit crossed a railroad and finally I found that one of the wires was spliced directly over the track. Taking that wire down and putting up a wire that was not spliced cleared the trouble. The wire I removed had been up for about nine months, long enough to allow the smoke from locomotives to form zinc sulphate, eating the galvanizing away and allowing the moisture to attack the bare iron wire, thus causing a very high resistance in the splice. My theory for it working early in the morning is that at that time there was enough moisture at the splice to make the electrical connection, which the sun and smoke would soon spoil.

But this is what I learned. Never put a splice in a line directly over or near railroad tracks. Wires over such crossings will have to be replaced often enough, at the best.

West Liberty, Ohio. Chas. F. De Remer,
Mgr. Logan County Farmers' Tel Co.

Transmission Loss Caused by Grounding Common Battery to Clear Cross Talk.

In your issue of August 7th, under the heading, "Letters on Practical Subjects," Mr. M. C. Wilson, of Clay Center, Kansas, describes how he has "cleared" certain trouble arising from an attempt to operate, on mixed lines, a magneto multiple switchboard with two conductor cords, which equipment is suitable and adapted for use on metallic circuits only.

The difficulties Mr. Wilson encountered are self evident as his so called "cross-talk" was merely ordinary conduction between lines tied together through his common testing system. The plan adopted—that of grounding the positive side of the battery—has most certainly removed all cross-talk due to conduction, but I wish to call attention to the fact that this has very seriously impaired transmission in all connections involving a grounded line.

By grounding battery, as indicated in his sketch, Mr. Wilson has arranged his ring-off drops so that one of their two windings becomes short circuited whenever a connection with a grounded line is put up.

This bridges from line (through the battery) to ground in all such connections, a 250 ohm coil, which is in effect the primary winding of a repeating coil with the secondary winding short circuited. Under these conditions a very large amount of talking current is diverted to earth from the tip side of the cord through the 250 ohm winding to the center tap and thence to earth through the storage batteries which cannot be considered a factor as far as resistance is concerned. Proper transmission becomes impossible under this condition.

To find out how great is this transmission loss, connect an ordinary magneto telephone to any line circuit right at the board. First let this short line be full metallic, and after inserting one plug of a cord circuit into the line jack it will be found that the side tone in the receiver of the testing telephone is almost unnoticeable. Then with the same connections, except one side of the line grounded, a side tone will be found almost as loud as if the testing telephone were on dead short circuit. The absence of the side tone in the first test proves the cord circuit clear-out drop opaque to voice current, when used as intended, on metallic circuits. The very loud and powerful side tone encountered in the second test proves the great loss in the same cord circuit, and its utter unfitness for long distance work in connection with grounded lines.

Magneto multiple boards for use on mixed lines should by all means be equipped with three conductor cords, so that the talking circuit may be kept entirely separate from the busy test commons.

In fact a three conductor cord circuit system in magneto multiple work is better and surer even where all the lines are full metallic. As it is now too late for Mr. Wilson to change his cord circuits to three conductor, the only remaining way out of his self inflicted transmission difficulty is to equip every grounded line entering his exchange with a high efficiency ring and talk through

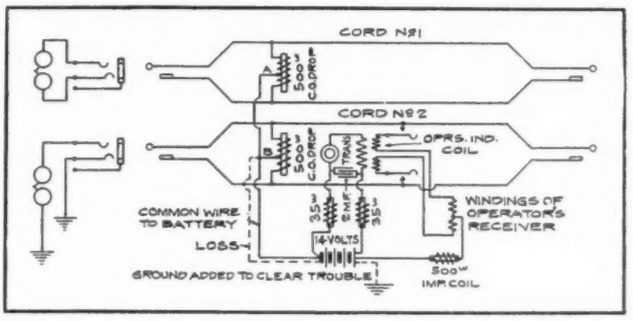


Diagram Showing How Transmission Loss Is Incurred.

repeating coils, so that all grounded lines may become metallic lines before reaching the board.

The ground on the positive side of the battery should be allowed to remain. In fact the manufacturer's circuits should have specified this ground in the first place.

Beloit, Kan. O. F. Cassaday.

An Easy Case of Trouble.

A telephone was removed by request on a farmers' line. Some few days afterwards the line was reported in trouble, and later found to be "short." The troubleman was sent out and soon reported the line clear. A couple of days later the same line was found in trouble. Before the troubleman had got far he again found the line clear. The third report proved to act the same as the other two. He again proceeded to "shoot the trouble." Inspecting the line throughout its length he found everything O. K., as far as he could see. Coming back he cut the drop that ran to the house where the telephone had been removed, which cleared the line. Inside the house the subscribers had hung a calendar over the hole through which hung the unremoved duplex. The calendar pressed the ends of the duplex together, throwing a "short" on the line.

Bradford, Ohio. Fred S. Bishop.

Telephone Tries to Establish Union Hours.

Referring to the letter of your correspondent F. D. P., N. Y., in your issue of May 1st, about a telephone which would only work eleven hours per day, I would say that

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

I had a very similar trouble on a long trunk line a few years ago.

Anywhere between 11 p. m. and 3 a. m. the drops would fall at each end of the line. The operators would go in and get each other, but no one else, and the line would be very noisy. This trouble would disappear each morning

somewhere between 5 a. m. and 8 a. m., and the line would work well all day. Repeated tests, though not satisfactory, led up to the theory that it was in a certain twenty-mile section. This section was carefully gone over and the wires trimmed. Nothing definite was found, but the trouble disappeared.

My theory is that, as the line was very close to a telegraph line in several places, by the contraction of the wires at night one was brought into contact with a telegraph wire carrying current, and a ground on the other side of our line completed the circuit. It was during the months March and April that we had this trouble, and in that section of the country the temperature changes at that time of the year between the hours of sunshine and dark are considerable.

Nova Scotia. F. A.

The Telephone in the Courts

By A. H. McMillan

Use of Switching Device by Subscriber.

Please find enclosed herewith a copy of an alternative writ of mandamus, filed against our company. We ask you to kindly give us reference to all cases that are similar, or such cases containing favorable decisions to our side of the question.

Can we be compelled to allow a subscriber to install a switching device at his residence whereby he can answer the Bell telephone, Farmers' telephone and our telephone calls, by the use of a Bell telephone downstairs, also being able to answer the same three lines with our telephone upstairs by the use of a similar switching device? We have allowed such an arrangement to exist in this Dr. Martin's house for seven or eight years, merely by never forcing him to take it out. We have not agreed to the use of this device either by verbal or by written contract, but now we see fit to demand that the subscriber discontinue the use of such a device on our line.

Have we given the doctor any rights that he can hold in court from the fact that we have allowed him to maintain this switching device on our line for seven or eight years?

Thanking you for an early reply to the above questions, we beg to remain,

The Editor does not believe that a subscriber has any right to install a switching device at his residence without the permission of the company. Your contracts with your subscribers undoubtedly contain a regulation forbidding them to use, in connection with your wires, any apparatus not furnished by you. Under such a regulation, subscribers can not connect a private set of extension instruments with the line. The same principle would prohibit them from connecting a switching device not furnished by your company on your wires; Gardner vs. Providence Tel. Co. (R. I.) 49 At., 1004; Beach vs. Chicago Tel. Co., Appellate Court of Ill.; McMillan on Tel. Law, Ch. 16.; State vs. Cadwallader (Ind.) 87 N. E., 644.

Your having permitted the doctor to use this switching device on your line for a number of years does not establish the right in him to do so. Your acts do not amount to what is called in law "an estoppel." Estoppel is defined to be the preclusion of a person from asserting a fact by previous conduct inconsistent therewith. In such a case as you state an estoppel could not arise unless you had designedly induced the doctor to alter his position injuriously to himself. This has not happened in the case you state. 1 Bouvier Law Dict., 607, 608.

House Moving in Indiana.

Will you kindly give your interpretation of the Indiana law governing the moving of buildings along the streets or public highways?

We have parties here that claim a telegraph or telephone line across a street is an obstruction, and that we are compelled to care for all wires or cables regardless of cost or damage to let them through.

Even though a telephone line across the street is an obstruction, a house mover has no right to require the line to be taken down for his accommodation, because the streets were not made for the transportation of houses, and a house is more of an obstruction to a street than a telephone line. If there is no way for the building to be moved except across the street occupied by the telephone line, and the parties desiring to move it have permission from the proper authorities, telephone companies are obliged to move their wires to let the building pass. If a house mover can use a side street or alley just as well, he can be required to do so. The company may rightfully demand that the house mover give it a bond to pay all expenses and save the company harmless from injury or possible damages. If a house mover is unwilling to indemnify the company against possible damages, and to pay the expenses of the temporary removal of the wires, an injunction may be secured to prevent his interference.

McMillan on Tel. Law, Sec. 240; N. W. Tel. Exc. Co. vs. Anderson (N. D.) 98 N. W., 706.

Another View of the Pomona Case.

In TELEPHONY of September 4, 1909, an account was given of the decision of the United States Court of Appeals in the case of the Sunset Telephone and Telegraph Co. vs. the City of Pomona, the decision being in favor of the company and reversing the judgment of the United States Circuit Court. The fact has since developed that there was a dissenting opinion filed in the case by Judge Gilbert in which he agreed with the lower court and favored the city of Pomona. The fact that this dissenting opinion was filed was not mentioned in the California papers, nor made known in the thousands of circulars about the companies, distributed by interested parties. In fact the dissenting opinion is said to have been suppressed even in the records of the court.

By the opinion of the majority of the court, it is held that the telephone company had acquired a franchise for the use of the streets by virtue of Section 536 of the Civil Code of California, enacted March 21, 1872, which provided that "telegraph corporations may construct lines of telegraph along and upon any public road or highway, or across any water or lands within this state," etc. Judge Gilbert holds that the word "telegraph," as used in Section 536, does not include the telephone, because telephones were not known at the time the statute was adopted, and that therefore the telephone company has no franchise in the city of Pomona.

Duty of Telephone Linemen to Inspect Light Wires.

A telephone lineman, while working on the company's wires, received a charge from electric light wires belonging to the city, and strung on one of the cross arms. The iron tie wire holding the electric light wire against the glass insulator was inbedded in and had cut through the insulation of the light wire, and a portion of the insulation was broken off the tie wire near the end. The lineman came in contact with the light wire and received a fatal shock. He was a competent and careful workman. Suit was brought by his administratrix against the city alone. Evidence showing that the employes of the telephone company had moved the electric light feed wires, strung on the cross arms of a pole on which they were working on

telephone wires, was held not to have been shown to cause the defective condition in the insulation of the light wires whereby the lineman was killed.

The defense of contributory negligence was made. In pointing out the degree of care required from the lineman, the court charged the jury that he was bound to exercise the care and caution that an ordinary, prudent man of his experience, knowing the extremely dangerous character of the lines carrying a high voltage, would ordinarily observe, having regard to the insulation ordinarily employed. The charge practically required the lineman to observe the conditions of the insulation of the light wires. These instructions were approved by the Supreme Court of Michigan, and a judgment against the municipality affirmed, although the defense was made that the municipality was free from liability because it was engaged in a public duty and was performing a governmental function. Hodgins vs. City of Bay City, 16 Detroit L. N., 284.

Answers to Practical Questions

Subscribers may submit for answer in this department any questions on practical telephone topics, such as construction, circuits, electrical theory, troubles, operating, traffic, costs, records, business methods, etc.

The answer to each question will be furnished by a man recognized as expert in that particular branch of telephony.

In case the answer cannot be published it will be forwarded by mail. No charge is made for this service, and subscribers are encouraged to consult us freely and frequently.

In every case a thoroughly complete description of local conditions is required to insure a satisfactory answer.

Ringing Circuit with Buzzer in Series.

I enclose drawing ,Fig. 1 *A*, of ringing circuit of one of our boards. The vibrator is 80 ohms, cut in series in line *B*. *C* and *D* are cord and plug connection to a telephone having a 1,000-ohm ringer on line. We are unable to make the vibrator move when we ring out on such lines. The vibrator rings good when we ring any 80-ohm series telephone, but on all 1,000-ohm bells it makes no sound. What change can be made so that the operator can tell when she is ringing a subscriber having 1,000-ohm bell?

You can remove the 80 ohm buzzer and replace it with a

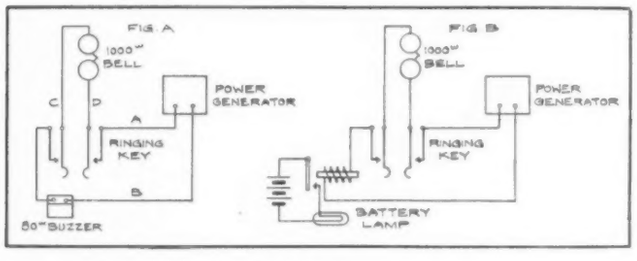


Fig. 1.

ringing relay, one which will pull up reliably on alternating ringing current of small strength. Use this relay to close a local circuit through a lamp and dry cells, as per Fig. 1 *B*.

Write to any of the prominent telephone manufacturers for a relay of this kind.

Subdivision of Accounts.

I noted an item on telephone accounts in issue of June 12, and if it is possible, without covering the same ground, would like to know the principal items which would go under the following headings: Operating, salaries, sundries; maintenance, wages, material; construction, wages, material; material purchased; general expense; sundries. Also would the total of maintenance, material and construction material balance the amount in the material purchased column?

Before defining the various items which are usually classified under operation, maintenance, construction, etc., it should be explained that in order to be absolutely accurate, and, in fact, to obtain the best results from every point of view, it is necessary to handle all material purchased through what is called a "clearing" account established for that purpose. A clearing account is one that is set up for the purpose of carrying certain expenditures which cannot be correctly apportioned to the proper accounts at the time the transaction is placed on the records. These accounts are considered as assets (the same as cash on hand), until it is possible to ascertain the accounts which are actually benefited by the expenditure and the amount chargeable to each. As soon as this is possible, the account is "cleared" by crediting it with the necessary amount and charging the accounts which received the benefit. It is usually found expedient to provide clearing accounts for the following:

"Store account," representing all material purchased and received at the storehouse being issued for use.

"Station material," representing all material sent out from the storehouse to exchanges in the system for use as needed.

"Shop account," representing all material issued to the shop and the labor cost used in assembling it into completed equipment.

"Team account," representing horse feed, stable supplies, etc.

"Freight, express and dray," representing the transportation charges on material.

"Supply expense," representing the cost of handling and accounting for material.

Some companies also find it advisable to handle the following through clearing accounts:

"Pay roll," representing wages and salaries due.

"Sundry expense," representing all items of expense incurred at exchanges.

"General expense," representing the expenditures chargeable to the business as a whole, which cannot be segregated against individual accounts.

When material is purchased and the invoice taken into the accounts it should be debited against the "Store account" and credited to "Accounts payable." When the material is issued from the store the store account should be credited with the cost price of the actual material issued. If it is used directly on the work it should be debited against the proper maintenance or construction account, according to what it is used for.

In the same manner the "Station material account" is cleared by charging out the material as it is actually used from the station supply. Thus it is plain that the total material purchased will not equal the total material charged to maintenance and construction. But the balance on hand at the first of the month, plus the amount purchased during the month, should balance with the total charged out for the month, plus the balance remaining on hand at the close of the month.

The "Shop account" is cleared by charging out all completed apparatus which may have been assembled or rebuilt at a price which will cover the items charged into it. If such apparatus is not used at once, but is placed among other stock on hand, the debit should be made against "Store account" the same as if the apparatus had come from an outside factory. If it is immediately used, the debit may be made direct to the proper working account.

The "Team account" is cleared by charging, into the work on which the teams are actually used, an amount equivalent to a certain rate per hour for the actual hours they are so used.

The "Freight, express and dray" and "Supply expense" accounts are cleared by apportioning them to the accounts to which the material used for the month is charged, and in direct proportion to the value of the material used.

"Pay roll" and "Sundry expense" are cleared upon the basis of daily distribution records which are kept, showing the distribution of each employe's time and each item of incidental expense.

"General expense" is cleared by apportioning it to the same accounts and in the same proportion as the labor for the month is charged.

By "Operation" expense is meant the cost incidental to operating and manipulating the apparatus necessary to a proper handling of the business or traffic over the circuits comprising the system.

In "Operation" should be included the following expenses:

Operating switchboard.
Rent, light, heat and care of central office.
Power.
Directory.
Sundries central office expense.
Removing and changing wire plant equipment.
Removing and changing sub-station equipment.

"Maintenance" should refer to the cost of keeping the property in as good and efficient condition as is possible by ordinary repairs. It should include the cost of testing for, locating and clearing all "troubles;" and of doing work which is intended to prevent trouble, such as pulling slack, tightening guys, trimming trees, etc. It should also include the cost of replacing all "short-lived" parts. It should not, however, include the cost of replacement of plant made necessary because of decay, natural deterioration from wear and tear, or obsolescence.

In maintenance should be included the following expenses:

Maintenance of switchboards.
Maintenance of other central office equipment.
Maintenance of central office buildings, fixtures and grounds.
Maintenance of overhead lines.
Maintenance of underground lines.
Maintenance of substation equipment.

These accounts should be kept separately for city, rural and long-distance plant, in so far as such separation is possible.

There are a few items which some companies usually charge into operation, but because of the definition which we have given to the term, it is necessary to place them in a division by themselves. These items compose what may very appropriately be called "Commercial expense," and are as follows:

Collection expense.
Uncollectible accounts.
Promotion of business expense.
Accounting and clerical expense.
Miscellaneous commercial expense.

"General expense" should include the following:

General office salaries.
Rent, light, heat and care of the general office.
Printing, postage and general office supplies.
Traveling expenses of officers.
Miscellaneous general expense.
Law expenses—general.
Maintenance of general office equipment.
Maintenance of general office buildings, fixtures and grounds.

A few items, such as "injuries and damages," "insurance," etc., cannot be distributed to any of the above accounts and may be termed "undistributed expense."

The above classifications cover practically all of the operating expenses (with the exception of the following charges):

Depreciation (reserve charge).
Contingencies, extraordinary (reserve charge).
Taxes.

The plant and equipment (or construction) accounts should include the following:

Organization.
Rights, licenses, etc.
Land.
Buildings, fixtures and grounds.
Central office equipment.
Pole lines.
Aerial wire.
Aerial cable.
Underground conduit.
Underground cable.
Substation equipment.
General office equipment.
Stores department equipment.
Teams and conveyances.
Miscellaneous equipment.
Miscellaneous construction and equipment expenditures:
- Salaries.
- Office supplies and expense.
- Law expense.
- Injuries and damages.
- Insurance.
- Taxes.
- Interest.
- Discount on bonds.
- Sundries.
- Cost of plant purchased.

These accounts should, as far as possible, be kept separately for city, rural and long-distance plants, and for general office and other departments indicated.

Feeding Chickens by Telephone.

The following item was published in the Chicago *Daily Journal* as an actual occurrence, in Atchison, Kan.

"Max Ulrich, a clerk in a freight office here, has solved a problem that will be interesting to many men whose wives go away on a visit, leaving them with the care of household duties. Mrs. Ulrich is away now.

"During the day Mr. Ulrich is very busy, and he cannot take time to run out home and get his lunch. In this house, besides a friendly cat, is a box holding a dozen little chickens which he keeps in the hallway near the telephone. Every morning Mr. Ulrich attaches one end of a string to the tiny bells on the telephone and the other end to a feed can on the edge of the chicken box.

"At noon Ulrich calls up. When the bells ring they jerk the strings and the feed can tumbles into the box, scattering feed to the chicks. In this manner he feeds his chickens by telephone."

The Toronto Convention

By W. R. Rutherford

The third annual convention of the Canadian Independent Telephone Association was held in the City Hall, Toronto, September 8. Dr. W. Doan, of Harrietsville, Ont., vice-president, occupied the chair, in the absence through illness, of the president, Dr. J. F. Demers, of Levis, Que. Mr. F. Page Wilson, of Toronto, the secretary-treasurer, made the arrangements for the meeting and assisted in welcoming the delegates.

After the delegates had registered the convention was opened by an address of welcome from Controller H. C. Hocken, representing Mayor Joseph Oliver, who had come into the room at the hour named for beginning and greeted a number of the visitors, but had been unable to remain, owing to other business.

Mr. Hocken extended to the convention the welcome of the corporation of the city of Toronto, on behalf of the mayor. He said the city appreciated the importance of the Independent telephone movement, and thought the influence of competition was of great benefit throughout the country. He wished the association great success.

Replying to the address of welcome, Mr. J. B. Ware, of Chicago, acting secretary of the International Independent Telephone Association, stated that the association had realized and demonstrated the value of competition in improving the quality of the service and thus creating a larger demand for it. He said that in 1895 there were some 245,000 telephones in use, with no competition, after nearly seventeen years of Bell monoply. Today there are 6,000,000 telephones in active service, after twelve years of competition.

Comparing this city of Toronto with some other cities, Mr. Ware pointed out that Cleveland, Ohio, with two systems, has nearly 50,000 telephones, while Toronto, with no competition, has approximately 18,000. Toronto needs connection with the Independent lines which run to within about twenty miles of the city on the east and on the west, but cannot go into the city.

In the Province of Ontario the Independents within the past four years have grown, until they now have reached 30 per cent of the aggregate number of telephones in use.

As to disadvantages in having two systems, Mr. Ware said that beyond the annoyance of having to turn to two books, there was very little objection, and as a matter of fact very few people have the two systems installed as the Bell is usually driven out.

The report of the secretary-treasurer, Mr. F. Page Wilson, stated that the number of rural companies had rapidly increased throughout Ontario. The number of independent telephones in use in Canada was placed at between 26,000 and 27,000. The formation of district associations was urged. Gratification was expressed that in the past year the Board of Railway Commissioners for Canada had decided that independent companies should be allowed to install telephones in railway stations.

Addresses were given and papers read on the following

"Is the Telephone a Natural Monopoly?" Francis Dagger, Toronto, formerly of Regina.

"Independent Telephones in Railway Stations," C. Skinner, Sherbrooke, Que.

"The Exchange Directory," Dr. W. Doan, Harrietsville, Ont.

"Reasonable Toll Connection Arrangements," S. L. Squire, Waterford, Ont.

"The Ideal Telephone System as so Regarded by the Subscriber," A. Denholm, Blenheim, Ont.

"Good Construction," W. H. Lytle, Petersborough, Ont.

"The Independent Telephone Situation in Canada," F. Dagger.

The Committee on Finance recommended that the ordinary expenses of the Association be provided by contributions from the Independent companies on the same basis as last year, with such amounts as the manufacturers may donate.

It also recommended that the president and secretary be authorized to correspond with the manufacturing companies relative to the expense of maintaining an agent whose sole duties shall be to encourage the increase in number and extension of operations of the Independent operating companies. The report was signed by A. Denholm, T. F. Thompson and F. Page Wilson.

The committee on resolutions submitted its report, which was adopted. One resolution provided that no member of the Association shall enter into any agreement or arrangement for the interchange of business over the lines of the Bell Telephone Company of Canada and that the companies should avoid making any connection arrangements which would in any manner rob an individual operating company of any Independent rights.

It was recommended that three men be appointed as a Legislative Committee. Their duties will be to watch any legislation which may in any way affect the telephone situation, and also to advocate the introduction of any laws which may benefit the Independent companies.

A resolution was adopted advocating government ownership of all long-distance lines and calling upon the Ontario Legislature to undertake the introduction of such a measure.

The election of officers resulted as follows: President, W. Doan, M. D., Harrietsville, Ont.; vice-president, C. Skinner, Sherbrooke, Que.; secretary-treasurer, F. Page Wilson, Confederation Life Building, Toronto, Ont.

Executive Committee: Francis Dagger, Toronto; Dr. J. F. Demers, Levis, Que; G. W. Jones, Clark, Ont.; T. W. Ralph, North Augusta, Ont.; A. Hoover, Green River, Ont.; S. L. Squires, Waterford, Ont.; M. House, Bridgeburg, Ont.; Levi Moyer, Beamsville, Ont.; T. R. Mayberry, M. P. P., Ingersoll, Ont.

After some discussion it was decided that the Association should appoint a permanent paid secretary, who shall give such portion of his time, and at such remuneration, as the Executive Committee shall determine. Mr. Francis Dagger, of Toronto, lately of Regina, Sask., was appointed to this position.

Mr. F. Page Wilson is to continue as secretary pending the completion of arrangements with Mr. Dagger.

It was decided to meet again next year in Toronto on the second Wednesday of the Exhibition.

State of Mississippi Prosecutes Bell Company for Violating Anti-Trust Laws.

Attorney General Stirling, who has just returned from a short vacation, has resumed the work of prosecuting corporations alleged to have violated the anti-trust laws of

Gen. Stirling on Aug. 30 began proceedings against the Cumberland Telephone & Telegraph Company, charging violation of the trust laws in making an alleged compact with certain Independent lines not to forward long-distance messages except over the Cumberland's lines. If the charge is sustained the Cumberland will be liable to heavy fines and penalties, including ouster proceedings, driving it out of the state.

Events in the Field

CONVENTION OF INTERNATIONAL ASSOCIATION, CHICAGO, DEC. 7, 8, 9, 1909

Texas Convention, Dallas, October 28.

Calling the Bluff.

A man who sits in an office close to Wall Street and the ticker is liable to lose his perception of perspective. When you lose your perception of perspective you think that everything which happens to be a long way off from yourself is mighty little, and no 'count. But these people who imagine the world revolves around their easy-chairs sometimes have forced upon them the old geometrical truth that the center of a circle is a point having no dimensions, while the outer border of the circle is the line that counts up the tally on a tape measure.

Eastern bankers and investors may include few persons who know J. B. Earle, of Waco, Texas. Telephone men know that he is a clear-headed, capable, honest manager of telephone property; that he has built up a good plant, a good service, and a good business against odds; that he knows telephone conditions in his own state exceptionally well; and that he is one of the best men in Texas to have for a friend, but a tough customer if you try to force him into a fight.

When rosy, rotund Joe Chapple was furnished some reading matter which might do the Bell telephone company a little good he probably cared as little as he knew about whom it hit; the object—to boost A. T. & T. stock in the market—was the only thing in sight. So the paper printed among other delightful imaginings a few things about Earle's companies at Waco. Whatever effect this had on Wall Street does not seem to have been visible, even with a telescope; but it did stir up a fuss at Waco.

Here are some fitting comments upon quotations from the National Magazine article, as they appeared over J. B. Earle's signature in the Waco *Times Hearld* of September 5:

"With few exceptions, the opposition (meaning the Indedependent companies) can hardly be said to have achieved any great success and in most places they can be characterized as real failures. At Waco, the opposition exchange was backed by some of the best business men in the town, who conceived the idea that the rates of the Southwestern company were exorbitant, although they were offered an opportunity to visit Lowell, Mass., at that time the executive headquarters of the Southwestern company, at the company's expense (generous, wasn't it, to make this offer just to convince them that they were laboring under a delusion?), and go thoroughly into the books and accounts with the view of satisfying themselves that such was not the case. This they declined to do, and launched their enterprise in 1899. Their rates were considerably lower than those of the Southwestern company (whose rates at that time were $5.00 for business and $3.00 for residence service) and have since been maintained; and, notwithstanding this, however, the Southwestern company has remained in the lead."

A good joke! The Southwestern has less than 1,600 telephones, and the poor old Independent has only a little over 2,700 telephones.

Again it says:

"At its inception the opposition movement showed considerable vigor and aggressiveness, but as time has gone by these characteristics have disappeared, and it can hardly be said that it constitutes any particular disturbing element in the affairs of the Southwestern company."

The foregoing may all be good reading to the officials at Boston, but it would be amusing to compare these statements with the regular monthly reports and the excuses for shortages, as well as the reasons given by the management at Waco for their loss of subscribers and the corresponding increase in the number of the subscribers to the service of the Independent company at Waco.

Was a more glaring combination of falsehoods ever put in print? Could anything be said that is more directly opposite to the truth than this article as published?

The article also says:

"The policy of the Southwestern company toward its patrons has always been conservative and liberal. It has been the aim of the company to give the best service at the lowest rates (Wonder what shooting school they attended? Must have been a peach!), and it cannot be disputed that there is no section of the country where these conditions prevail in a more marked degree than in Texas and Arkansas."

While we cannot speak as to Arkansas, the reverse of the conditions as above mentioned are very *marked* in Texas, especially as to low rates and the best service, to say nothing of its liberality.

Now, as to failures of the Independent companies. Is the Waco property a failure? If so, how is it that the Independent exchange in Waco has more subscribers connected with it than the Southwestern company has in the entire county of McLennan? The new directory, as published by the Southwestern company a few days ago, contains 54 pages, two pages less than the previous issue, and shows less than 1,600 subscribers, while the last directory published by the Independents shows 108 pages, an increase of 14 pages over the previous issue. The total number of subscribers to the Independent exchange proper is 2,396, and in addition to this number, free service is given to 314 county subscribers, a total of 2,710. That certainly looks like failure, and that the Southwestern is in the lead. And, in addition to this, every town in McLennan county, where both companies are represented, the Independents are in the lead as to the number of subscribers. More failure.

How about the Paris, Texas, exchange being a failure? At this place the Indepndents simply eat the Southwestern up. So great was their loss at this place that they were compelled to reduce the rates for residence telephones from $2.00 to $1.50 per month. Another case of the failure being reversed. How about Hillsboro, San Antonio and El Paso? All pretty good pieces of property to be classed as failures, and also possibly a "disturbing element in the affairs of the Southwestern company."

Now, as to service. Who gives the best service in Waco? You, conservative reader, are better able to answer this question, and then we would refer you to the Dallas *News* of the 17th instant, wherein it relates that the manager of the Southwestern company at Fort Worth was caused to appear before the commissioners of that city, and requested to explain the reasons for the rotten service the company was furnishing to its patrons in that city. The same thing has happened in Dallas, Houston, San Antonio and El Paso. This is competent evidence to show that their service is the best, isn't it?

And now we will tackle those "lowest rates." When the Independents started in Waco, they placed their rates at $3.00 and $2.00, the Southwestern previous to that charged $5.00

and $3.00, but the day the Independent exchange was opened for business the Southwestern rates were reduced to $3.00 and $2.00, the same as the Independent rates.

In the fall of 1907 the rate for business telephones was raised by the Southwestern company to $4.00 per month. This action caused general dissatisfaction among the business element. However, the increase in rates stuck, hence the decrease in numbers. And it is a conservative estimate that since the Southwestern company made a general raise in rates for business telephones, it has lost not less than 25,000 subscribers in this state. That does not look like failure, does it? That indicates conservatism and liberality.

Elsewhere in their article they say: "The potential value of any telephone service depends entirely upon the number of people it may bring into prompt and satisfactory communication with each other."

If this be true, then the value of the service rendered by the Independents at Waco is 50 per cent greater than that rendered by the Southwestern company, as the Independents give you service to nearly 50 per cent more subscribers, and at 25 per cent less cost, which proves by their own words that they are charging you for what you do not get. In other words, should they not reduce their rates since they have reduced their "potential value?"

But listen to this: "It is a rare case where the service furnished by the Bell company justifies the necessity of a dual system." Say, just omit the word "rare" and you will have a sentence that sounds good to any person who is a subscriber to a Southwestern exchange where they have no opposition. Specific cases, Dallas and Houston, as the so-called Independent exchange in Houston is independent in name only.

They also allege, in speaking of the Pioneer Telephone & Telegraph Company (the Oklahoma Bell): "The policy of the Pioneer company toward the various Independent companies in the state is one that is worthy of considerable credit. It never seeks to crush its weak and struggling competitors, but gives them advice and assistance whenever possible. If it should develop that the Independent concern is compelled to sell out, it will buy, if a satisfactory price can be agreed upon." Now, isn't that nice and kind of those Pioneer folks? Just to think—if "a satisfactory price can be agreed upon"—just the same language as used by the Standard Oil Company. But I wonder what happens when that "satisfactory price" cannot be agreed upon. Possibly that is where the "wreck and ruin" policy makes its appearance.

The picture, as drawn by the forceful writer in the National Magazine, is decidedly "rosy." It goes to show the extent and the means that are used by this "octopus" to belittle competition. But from our experience in dealing with this monopoly, we have found that by "taking the bull by the horns" and administering to it a few good swift "kicks in the snout," they will be good.

Probably, if our "vigor and aggressiveness had not disappeared," as they state in the opening of their article, the losses of the Bell company would have been worse; but it is not yet too late, as Dallas and Houston will be in the race within the next twelve months and will undoubtedly cause the Bostonian representatives in this neck of the woods to sit up and take notice, as the Independents are not dead; neither are they sleeping, as future events will prove.

While their article as a whole is a fabrication from beginning to end, and is in keeping with the usual practices of these people, it will have little weight with intelligent people. And especially will it fail of its purpose with the people in the territory covered by the Southwestern company. However, it may help to bolster up the weak-kneed suckers who have been inveigled into buying their stocks and bonds at inflated values. Respectfully submitted, J. B. Earle.

Valuable Addition to A. I. E. E. Library.

The American Institute of Electrical Engineers announces the receipt of a valuable addition to its library, consisting of a large collection of patent specifications.

The patent library which the institute thus acquires consists of 461 leather-bound volumes, containing approximately 100,000 specifications. These specifications begin with May 30, 1871, and run to December, 1908, thus covering the entire period of activity which includes the telephone, the electric light, electric railways and the electric motor. From May 30, 1871, up to the last day of 1887 the volumes are complete, containing all the specifications issued by the Patent Department, certified. From July, 1887, up to Dec. 1, 1908, the volumes contain all the electrical specifications which are not certified.

The original set cost over $4,000, and duplicates of these specifications, if now purchased from the government and bound, would cost between $4,000 and $45,000. This library has been accumulated by the Western Electric Company, which now gives it to the Institute. Mr. Edward Caldwell, chairman of the library committee of the Institute, has already taken the matter in hand as to proper care and installation of the library, so that the members may derive the greatest possible benefit from having such a collection at their disposal, and has also taken measures to complete the set to date. It is a fortunate coincidence that the Institute had already been presented with a set of specifications antedating the period represented in this gift.

Merger of Eastern Bell Companies Practically Accomplished.

Despatches from New York state that the merger of the four largest Bell companies operating in the East is assured. On the first of September it was announced that fully 90 per cent of the stockholders of the New York and New Jersey Telephone Company, the Bell Telephone Company of Pennsylvania, the Central District and Printing Telegraph Company, of Pittsburg, and the Bell Telephone Company, of Buffalo, have presented their stock certificates in exchange for stock of the American Telephone and Telegraph Company.

One share of the American Telephone and Telegraph Company is given for each share of New York and New Jersey, for one and one-seventh shares of Bell of Pennsylvania, and for one and one-half of the Buffalo Bell.

After the exchange of the stock of these four subsidiaries has been effected, it is expected the company will make similar offers to others of its subsidiaries.

New Long-Distance Lines in Mexico.

The government of the State of Sinaloa, Mexico, has under consideration the proposition of offering special encouragement in the way of liberal subsidies for the building of telephone lines. It is specially desired that the more remote localities shall be connected with Culiacan, the capital, by long-distance lines. A syndicate of California men in which H. E. Huntington of Los Angeles is said to be largely interested has on foot the project of building a long-distance telephone system down the Pacific slope, following the route of the railroad which the Harriman interests are building. The proposed long-distance line will enter Mexico at Nogales and connect the towns and cities of Hermosillo, Torres, Guaymas, Empalme, San Blas, Mazatlan, Tepic and a number of other places.

J. Sitzenstatter, who owns valuable concessions for the construction of long-distance telephone systems in the states of Vera Cruz and Puebla and the establishment of local systems in the cities and towns of those two states, has gone to England, where he will organize a company to carry out the terms of the concessions.

Annual Meeting of Citizens Telephone Company of Grand Rapids, Mich.

The annual meeting of the stockholders of the Citizens Telephone Company, of Grand Rapids, Mich., was held in the home offices, September 14. The reports of Secretary E. B. Fisher and General Manager Tarte covered the affairs of the company ending with June 30, last.

In the system there has been an increase of 1,029 stations. The net increase in the city exchange has been 635 stations, while the increase in gross earnings has been $30,002.39. The table of receipts shows a total of $633,456.27; disbursements, operating maintenance, reconstruction and depreciation, $328,597.14, which strike the balance. Nothing is carried to surplus this year, that amount standing at the former figure of $133,000. The usual quarterly dividends of two per cent. were paid during the year from the net earnings. The excess of earnings over the eight per cent. paid out for dividends was charged off as an extra-depreciation charge and included in the figures given.

Since July 1, there have been liberal sales of stock, leaving but $125,000 unissued of the authorized capitalization of $3,500,000. In view of the prospects, the directors have decided to recommend another increase in capital stock.

Mr. Tarte called attention to the gain in stations, Grand Rapids now operating 10,010, while the entire system has increased to 27,855 stations. The Citizens system now connects with 2,800 mutual telephones. The system now comprises 1,647 miles of poles, 3,079 miles of copper metallic circuits, and 1,106 miles of iron metallic circuit. New circuits to Traverse City and Manton have brought the cities and towns of Northern Michigan into closer business relationship with Grand Rapids.

A copper circuit has been constructed into Kalamazoo, and the facilities at Lansing, Battle Creek, Jackson and other points have been greatly improved.

During the year an automatic system has been installed in Lansing at a cost of $83,000, while the facilities for handling the Grand Rapids business have been considerably bettered by the erection of another substation.

More than 695,000 long-distance messages were handled last year, and various items of construction work aggregated $212,825.77.

There was no change made in the list of directors or the management. The officers are: President, Chas. F. Rood; vice-president, Edward Fitzgerald; secretary, E. B. Fisher; treasurer, W. J. Stuart; general manager, C. E. Tarte. Directors— R. D. Graham, Philip Graham, J. B. Ware, L. J. Rindge, John Martin, C. E. Perkins, Louis Perkins.

Oklahoma Corporation Commission Orders Long-Distance Rates Reduced.

Cuts in long-distance telephone rates throughout Oklahoma, amounting in many cases to fifty per cent, are proposed in an order issued recently by the Corporation Commission informing all Oklahoma telephone companies that a hearing will be given October 12 on the proposed order. Under the proposed order telephone rates must be computed on air-line mileage and the day rate on a fifty-mile long-distance call would be but 25 cents and the night rate 15 cents.

Figuring rates on the air-line basis, the order permits telephone companies to charge a cent a mile for the first ten miles and four-tenths of a cent a mile for each mile in addition to the ten miles. Three minutes shall be allowed for each telephone conversation, and the companies are permitted to charge one-third of the initial toll for each minute in addition to the three minutes.

The night rate shall be two-thirds of the day rate. Through rates and through connecting rates shall be computed on the same basis, but in the case of through connecting rates, the various companies whose lines are used, shall pro-rate the toll on the mileage basis. If the companies can not agree the Corporation Commission will fix the basis for the division.

All toll charges shall end in 0 or 5.

Another order by the Corporation Commission fines the Pioneer telephone company $100 for raising its rates at Oklahoma City without the consent of the Commission and provides that an additional fine of $100 shall be assessed against the company until the original rates are restored.

Both the proposed order and the order fining the Pioneer company for contempt are signed by Commissioners Jack Love and A. P. Watson.

Columbus Citizens' Company Rebuild Franklin County Telephone System.

The Columbus Citizens Telephone Company of Columbus, Ohio, has employed Engineer B. H. Brooks to go over the property of the Franklin County Telephone Company, a subsidiary concern, with a view of placing it in first-class physical condition. Mr. Brooks was formerly connected with the Columbus concern and about two years and a half ago went to the Home Telephone Company, of Detroit, as an expert.

The Columbus company now has more than 3,000 telephones in the country outside of Columbus, which are connected with the Columbus exchanges.

As yet no final report has been made in the question of taking over the property of the Lancaster Telephone Company of Lancaster, Fairfield county. General Manager G. R. Johnston, of the Columbus Citizens Company, has made up a preliminary report. Experts are still at work on the proposition. The same is also true of the Independent plant at Washington Court House, Ohio.

Fine Record of a Michigan Company.

A company which is well worthy of notice, because of its remarkable and steady growth within recent years, is the United Home Telephone Company, of Ludington, Mich., formerly known as the Lake Shore Telephone Company. About a year ago, W. A. Carter, C. G. Wing, Wm. Rath, Thos. Bromley, Jr., J. K. Flood, G. T. Sands, H. S. Newton and several others, all residents of Ludington, organized the United Home Telephone Company, with a view to purchasing the Mason County division of the Lake Shore company and installing an up-to-date plant in Ludington. This was accomplished, a modern fireproof brick building being erected for the exchange and general offices. A central energy switchboard with an ultimate capacity of 3,000 lines was installed. In the outside plant no open wires were used, aerial and underground cable being installed, necessitating the installation of about 90,000 feet of cable.

In addition to the work in Ludington, thousands of dollars were spent in rebuilding the county lines throughout the county, making them full metallic, and adding extensively to them, work which was made necessary by the great demand for service.

The company also added greatly to its long-distance service, new copper circuits being built, connecting its lines with those of the Citizens' Telephone Company, giving direct connection with Grand Rapids and Saginaw and from there with points in Michigan, Indiana and Ohio.

The systems in Montague and Whitehall were also entirely rebuilt, the company expending in the neighborhood of $118,000 in giving the residents of Mason county a thoroughly up-to-date telephone system, with the best possible service. Much credit is due the men whose untiring efforts brought about this condition.

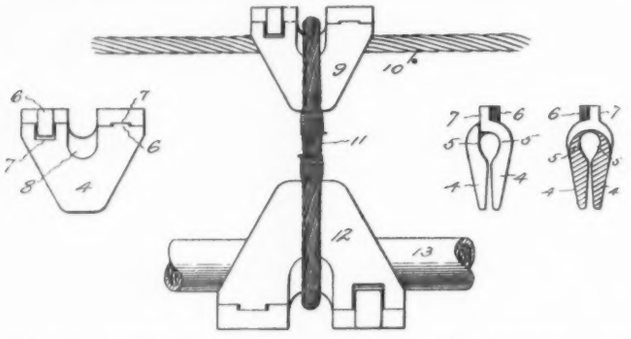
From the Patent Office

By Max W. Zabel

CABLE CLAMP.

W. H. Kempton, Hartford, Conn., patent 931,930, Aug. 24, 1909, assigned to the Johns-Pratt Company, Hartford, Conn.

This cable clamp consists of two mating members 6 and 7, which are intended to be placed upon the messenger wire 10,



and two mating members 12, which likewise interlock, and through which the cable 13 is designed to pass. Grooves in these mating members are adapted to receive the wire or rope 11, which holds them together.

MEASURED SERVICE AUTOMATIC TELEPHONE EXCHANGE SYSTEM.

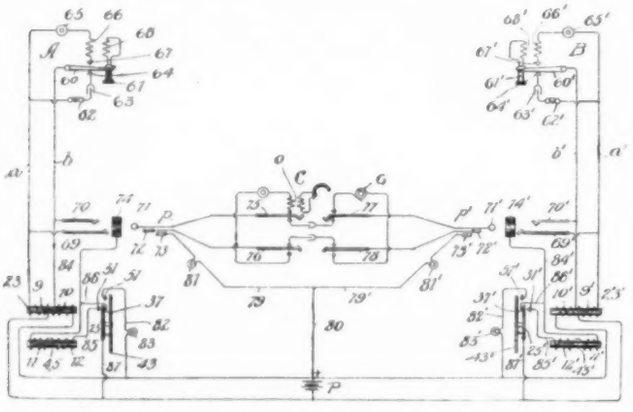
W. W. Leach, Chicago, Ill., patent 931,132, Aug. 17, 1909; assigned to Rhoda A. Leach, Chicago, Ill.

This patent covers measured service apparatus for an automatic telephone exchange, and provides a coin-controlled apparatus at the substation. It is necessary to deposit a coin before the subscriber can operate the switching apparatus at the central station, and when the called subscriber answers, a toll device is finally operated to deposit the coin. If the called line is busy, or if, for any reason, the called party does not answer after being signaled a predetermined period, the toll device is so operated as to restore the coin to the calling subscriber.

RELAY MECHANISM.

S. B. Fowler, LaFayette, Ind., patent 931,854, Aug. 24, 1909.

This common battery system is designed to cover a new kind of relay, which is of such construction that one arma-



ture 25 is attracted, and at the same time carries with it a second armature 43, which is magnetically shielded from the coils 9 and 10 by the armature 25, but is under the magnetic influence of the coils 11 and 12. When initiating a call, the coils 9 and 10, in association with a battery *P*, energize the relay to attract armature 25, which breaks contact 37 and makes contact 31, and simultaneously makes contact 51, thereby to light the lamp 83; then, when the plug is inserted, coils 11 and 12 are energized, as will be readily apparent, to break the contact at 51, and put out the supervisory lamp 83.

MOUTHPIECE ATTACHMENT.

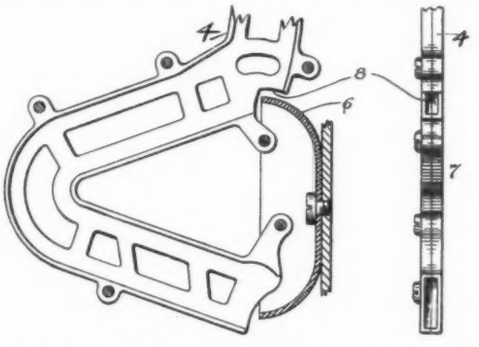
J. B. Burkholder, Minneapolis, Minn., patent 933,228, Sept. 7, 1909.

This antiseptic mouthpiece comprises a device for carrying the antiseptic material which is placed within the mouthpiece, and is held by means of a bar, extended through the openings in the rear, transverse wall of the mouthpiece. A cover is provided on the outer face of the mouthpiece, having backwardly extendeding arms, which are held tightly in position on the exterior surface of the mouthpiece by means of a circular, flexible band.

COIN CONTROLLED APPARATUS.

G. A. Long, Hartford, Conn., patent 932,036, Aug. 24, 1909, assigned to Gray Tel. Pay Station Co., Hartford, Conn.

This invention relates to coin controlled apparatus, and the object is to provide a run-way, 4, for the coins, which is so arranged that the coin in its passage therethrough strikes



the gong 6 twice, so that the operator gets a plurality of indications of the same signal, depending upon the demonination of the coin.

ANTISEPTIC MOUTHPIECE.

J. Haff, Los Angeles, Cal., patent 832,545, Aug. 31, 1909.

This antiseptic mouthpiece consists of a dish-shaped receptacle having a fibrous, absorbent material at one extremity thereof, which projects into the mouthpiece. A second annular cap screwed against the dish-shaped holder at the outer flaring end of the mouthpiece holds the antiseptic in position.

PRIVATE BRANCH INTERCOMMUNICATING TELEPHONE SYSTEM.

N. H. Holland, Chicago, Ill., patent 931,307, Aug. 17, 1909. Assigned to Western Electric Co., Chicago, Ill.

This invention relates to intercommunicating telephone systems, and provides means at two or more stations for maintaining the circuit continuity of a trunk line leading to the intercommunicating system from the central office exchange, said means being in addition to and in substitution of the telephone at said stations. By such arrangement provision is made for holding a trunk line, while the station at which the call is received has communication with another local station, without the central office party learning the conversation, or operating the disconnect signal at the central office. The invention also has other features.

TELEPHONE SYSTEMS.

H. G. Webster, Chicago, Ill., patents 931,904, 931,905 and 931,906, Aug. 24, 1909; assigned to M. G. Kellogg, Chicago, Ill.

This complete telephone exchange system described in the first patent comprises a traveling switch at the central station for each subscriber's line. It begins to operate through suitable step-by-step mechanism to connect the line when the receiver is removed to an unbusy cord circuit, so that the operator having this cord circuit can take up the call. When a cord circuit in front of the operator has been used, that operator does not get a second call until her connection has been completed. The other patents cover similar apparatus with different methods of operating.

PRIVATE BRANCH INTERCOMMUNICATING TELEPHONE SYSTEM.

J. L. McQuarrie, New York, N. Y., patent 931,138, Aug. 17, 1909. Assigned to Western Electric Co., Chicago, Ill.

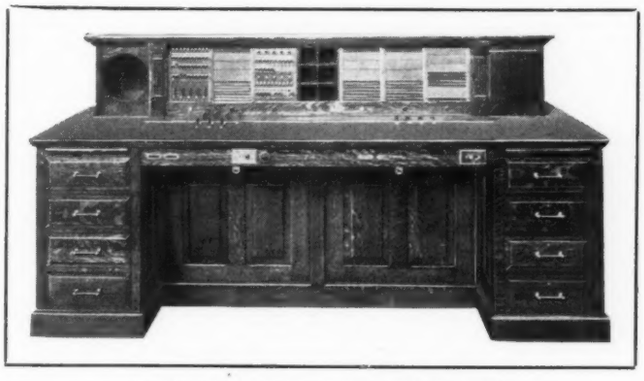
This intercommunicating system is somewhat on the same general order as patent No. 931,307, but differs from same in various little features of operation.

Factory and Sales

Desk Equipment in a Minneapolis Central Office.

The new equipment which is at present being installed in the East Branch Exchange, Minneapolis, Minn., for the Tri-State Telephone & Telegraph Company includes a set of desks of most attractive design. The desks for the chief operator, information operator and wire chief are quite similar in general appearance, the wire chief's equipment being shown in the accompanying illustrations. Sslected quarter-sawed oak, with a high golden finish is used for all the woodwork throughout the exchange. The desk woodwork, as well as other parts of the equipment are the product of the Stromberg-Carlson Telephone Mfg. Co.'s factories at Rochester, N. Y.

The desk construction is such as to render all cords, relays, and other apparatus readily accessible, both from front and rear. At each end of the desk the two upper drawers are designed for the reception of card files, while in the turret of the wire chief's desk provision has been made for mounting Weston flush type testing voltmeters. At present but one position is equipped, though the second position is wired for the same equipment as is seen in the

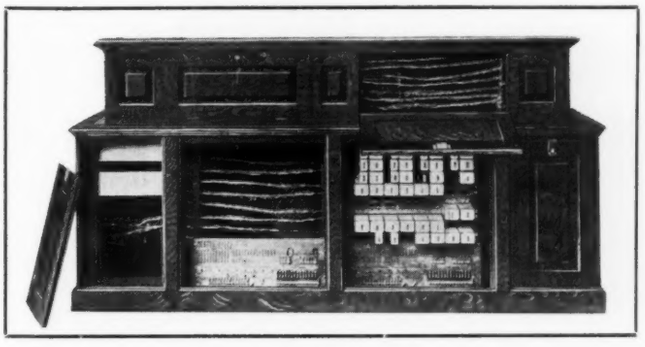


Front View of the Wire Chief's Desk.

first. Below is given a summary of the equiment as provided for the first position:

	Present.	Ultimate.
Incoming trunks from main board....	4	5
Service observation lines.....	2	5
Exchange line circuits.....	1	1
Local desk trunks (chief oprs. & infn.)	2	2
Test trunks to main oard.....	10	15
Test trunks to M. D. F.....	2	10
Wire chief's test circuit.....	1	1
Order wire circuit.....	5	5
Cord circuits	3	3
Line pilot circuit.....	1	1
Supervisory pilot circuit.....	1	1
Generator and ringing pilot circuit...	1	1
Night bell circuit.....	1	1

The tendency during the last few years has been to remove the cord circuits from the exchange desks, performing all the circuit functions by means of keys. This practice has been varied somewhat in the present case; the con-



Rear View, Showing Arrangement of Equipment.

trol of all outgoing and incoming trunks is obtained by means of the usual keys, but wiring for jacks is also provided in such a manner that a cord connection may be put up between trunks and supervised in the usual manner by the wire chief. Though such an interconnection between trunks is useful in a variety of ways, the most important perhaps is in case of trouble within the exchange upon an important line—say to a physician's office. Calls for such lines are routed to the wire chief's desk, and completed to the called subscriber through a test trunk to the main distributing frame. Each main distributing frame trunk is so wired that by means of associated push buttons the line may be tested through the heat coils, either heat coil tested separately, or a through connection established. Relays and lamps, which are also included in the circuit, notify the wire chief of a call, in or out, while the other portion of the circuit may be under test. The test circuit is equipped with apparatus for making all standard line and switchboard tests.

Improved "Harpoon" Anchor Meeting with Favor.

The "Harpoon" guy anchor, manufactured by the Crouse-Hinds Company, of Syracuse, N. Y., is reported to have proven particularly successful in the telephone field this season on account of several very material improvements recently incorporated in its design and manufacture; also, because of the very attractive manner in which the proposition has recently been presented to the trade. This anchor requires no special tools for installation and is not only of very simple construction, but strong. As now manufactured, there is no twist in the long rod, and the anchor is heavier and more substantial. The head of the rod is provided with extra stock and is shaped so as to withstand the hardest driving blows.

Its manufacturers, the Crouse-Hinds Company, have

branches at Chicago, Cincinnati and New York, where any inquiries or orders will receive just as prompt attention as at Syracuse.

McRoy Clay Works Makes Addition to its Sales Staff.

The McRoy Clay Works, manufacturers of underground conduit, announces that on September 1, Mr. Harold K. Weld joined the staff of its Chicago office.

Mr. Weld takes up sales engineering work, for which he

Mr. Harold K. Weld.

is especially well fitted, as his experience during the past four years has been along the line of underground conduit construction from the standpoint of the user. He is a graduate of the University of Wisconsin, in electrical engineering, and spent four years in the engineering department of the Chicago Telephone Company. His work while there dealt with the testing and inspection of aerial and underground construction material, also the preparation of specifications for materials and for methods of aerial and subway construction. He is an associate member of the American Institute of Electrical Engineers; a junior member of the Western Society of Engineers, and is also a member of the American Electro-Chemical Society and the American Society for Testing Materials.

He will make his headquarters at the Chicago office of the McRoy Clay Works in the Rookery Building, and the company is to be congratulated upon securing his services.

New House Numbering System in Chicago.

Owing to the new system of house numbering which went into effect in Chicago, Ill., on September 1, 1909, the addresses of a great many of the business firms are changed, and the following are the new addresses of some of the telephone manufacturing and supply houses:

Mathias Klein & Sons, 562 West Van Buren street; Homer Roberts Telephone Company, 654 Belmont avenue; Moon Manufacturing Company, 108-128 North Jefferson street; Frank B. Cook, 900-904 West Lake street; Runzel-Lenz Electric Manufacturing Company, 1751 North Western avenue; Stromberg-Carlson Telephone Manufacturing Company, 541 West Jackson boulevard; Hallett Iron Works, 515 West Polk street; Belden Manufacturing Company, 25 West Michigan street; American Battery Company, 1132 Fulton street; Monarch Electric & Wire Company, 110 South Clinton street; Swedish-American Telephone Company, 5235 E. Ravenswood Park.

It will be well for the readers of TELEPHONY to reserve this list for future use, as if the old address is used a great deal of time will be lost in the delivery of mail matter.

The Auto Wagon.

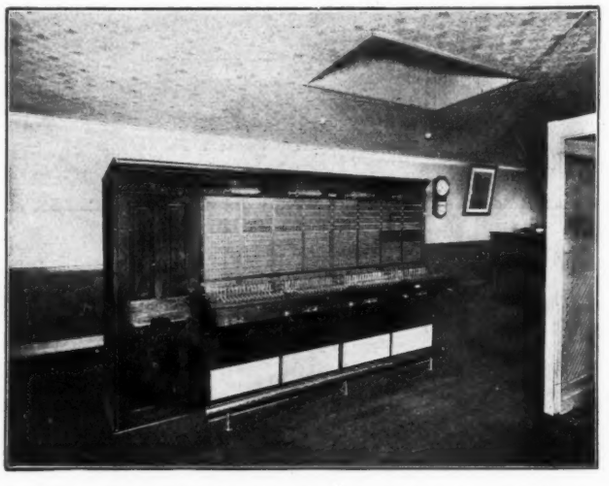
The International Harvester Company of America, Chicago, Ill., reports that its "auto wagon" for telephone purposes is meeting with great favor among the rural telephone companies. It is claimed that with these wagons a break in the lines can be quickly reached and repaired without any of the delays incident to the customary means of reaching a break with a horse and wagon. Often with a horse and wagon, a man will be gone all day, while with the auto wagon, the trip can be made in much less time, thus saving the man's time and also board for both man and horse.

The company has pamphlets containing a full description of its auto wagon, which it will send to those interested upon application.

Orders a Second Switchboard.

Less than a year ago the Greenfield (Ohio) Home Telephone Company installed the magneto multiple switchboard illustrated below and the Monarch Telephone Manufacturing Company has received an order for another board for an exchange operated by the same company. The new board is to have a capacity of 300 lines and, like the multiple board, will be furnished with bridged and series clearing out drops, recall lamps, and is to be equipped for a Monarch direct current selective system. That these features are reliable and of the greatest value in enabling an exchange to give perfect service is evidenced by the order just received from the Greenfield company.

Since the introduction of the bridged and series clearing out drops, many companies have equipped their old boards with them, as the work of installation is not difficult and the cost is small. Subscribers immediately notice the improvement in service and operators appreciate the relief from complaints that originated from lines being tied up. The simplicity of the Monarch direct current system is such that this also can be installed with but little trouble, even though it is desired to give selective service only on a few lines. The low cost of the equiment necessary for



Magneto Multiple Switchboard of the Greenfield Home Telephone Company.

this system enables this to be done profitably. No ringing device is needed and many companies are using for the ringing batteries, dry cells that have become too weak to use in telephones. Little attention need be paid to keeping of the batteries for the system is said to operate perfectly even if the batteries are almost run down.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

MR. B. HAYHURST has been appointed manager of the Home Telephone Company's exchange at Oregon City, Ore.

MR. ROBERT W. LESTER, who for a number of years has been manager of the Ogden Telephone Company's exchanges in Spencerport and Adams Basin, N. Y., has resigned to take up other work.

MR. C. D. SWISHER has resigned his position as superintendent of equipment of the Home Telephone Company of Detroit, Mich., and has become connected with the American Automatic Company of Urbana, Ohio.

MR. COHN M. KUHN, manager of the Christian County Telephone company at Pana, Ill., has tendered his resignation to the board of directors, taking effect Sept. 1. Mr. Kuhn will occupy a position in the Pana National Bank. His position at the telephone office will be filled by Edward Cheney.

MR. B. E. FERRAND, who for the past few months has acted as superintendent of the Inter-State Telephone Company of Dyersville, Ia., has resigned his position to accept a similar one at Waterloo, his home. His successor has not been elected.

NEW COMPANIES.

FEENVILLE, MICH.—A telephone company was organized at this place, and the following officers chosen: J. T. Master, president; Robert Cooper, vice-president; Charles Hutchinson, secretary; Charles Gotham, treasurer. Directors are: C. K. Taylor, Mr. Woorhees, Mr. Forester, T. Hagger and John Daly.

ASHER, OKLA.—The St. Louis Rural Telephone Company was organized at this place, with a capital stock of $3,500, by C. Boartman, W. S. Carson, J. W. Anthony, J. G. Threadgill, C. W. Williams, D. H. Smith, Joe Engle, W. A. Garrett and J. W. Green, all of Asher.

MARSHFIELD, ORE.—Telephone lines by the farmers are being built in different parts of the county. The Kenwell Telephone Company has just been organized and will give connections from farms on Haynes and Willanch Inlets and the towns of Cooston, across the bay to Marshfield and North Bend. A. G. Raab, principal of the North Bend schools, is president of the company. Another company just formed is the Rural Telephone Company to build from points on Catching Inlet. A third company is putting in a toll line from Roseburg and several farmer lines are being built in the Coquille Valley.

McCOYSVILLE, PA.—The Juniata Farmers' Telephone & Telegraph Company is the name of a new company organized with a capital stock of $50,000.

ARGYLE, WIS.—The Argyle Telephone Company, with a capital stock of $5,000, has been chartered by the secretary of state, and the incorporators are A. G. Hawley, H. F. Hawley and Dan S. Hawley.

REGINA, SASK., CAN.—With head offices in this city, the Rose Plain Telephone Company was incorporated to build rural telephone lines in the vicinity of the city.

BLACKWOOD, SASK.—The Pleasant Plains Rural Telephone Company, Ltd., is the name of a new company.

BIENFAIT, SASK., CAN.—Bienfait Rural Telephone Company, Ltd., was organized at this place.

MIDALE, SASK., CAN.—The Lac qui Earle Rural Telephone Company, Ltd., was organized at this place.

FINANCIAL.

PLATTSMOUTH, NEB.—The Plattsmouth Telephone Company has been granted the privilege by the Railway Commission to issue $45,000 in new stock, in addition to its capital of $109,500. This will be used in making improvements and paying off some indebtedness.

CONSTRUCTION.

KEOKUK, IA.—The Mississippi Valley Telephone Company is receiving new equipment and material for the enlargement and betterment of the system in that place. The Mississippi Valley Company recently purchased the Winchester Telephone Company of Winchester, Mo., which has added a great many subscribers to its list, beside giving it much better connection with Illinois, Missouri and Iowa.

IDA GROVE, IA.—The Battle Creek Independent Telephone Company is making a number of improvements to its exchanges in Battle Creek, Ia. New cables are being strung and a new switchboard will be put up. The company contemplates still more extensive improvements in the future.

HOLDER, ILL.—The Kinloch Telephone Company is building a new line from Bloomington to Holder.

LUDINGTON, MICH.—The United Home Telephone Company is quite busy of late installing new telephones and making improvements to its system in different places. The installation of a private branch exchange in the works of the Star Watch Case Company was just completed, and the cutting over of the Scottsville exchange into an all cable plant has also been completed.

ST. LOUIS, MICH.—The Union Telephone Company is preparing to expend about $20,000 in improvements and extensions to its system.

RICH HILL, MO.—The Papinville Telephone Company has received a new switchboard, which will be installed soon. It is reported to be modern in every respect and will give the subscribers the best of service.

SPRINGFIELD, MO.—The Frisco railroad is installing a telephone system between Kansas City and Fort Scott to take the place of the telegraph, with regard to the regulation of trains. The telephone will do away with the "breaking" of the system which has been the means of much inconvenience. Under the new system, when two operators are sending important messages, there is no possibility of an operator on the line between the two points breaking into the message. The system will be worked in connection with the automatic electric block signal. The lines will be extended to Springfield as soon as some preliminary work is finished.

MISSOULA, MONT.—The Montana Independent Telephone Company is preparing to build to the Coeur d'Alenes from here. About $200,000 will be expended in the valley.

WHITEFISH, MONT.—The construction of a direct telephone line to Columbia Falls has been commenced by Carl Green. At present all messages must go by way of Kalispell, and this new line should prove of great value to the residents.

MISSOULA, MONT.—Supervisior D. G. Kinney of the Missoula National Forest reports that the telephone line from Seeley Lake to Mountour, near Ovando, will be completed some time in September. The total length of the line will be 32 miles.

KEARNEY, NEB.—The Burlington railroad has a force of men at work putting in telephone lines between this place and Hastings. The telegraph instruments will be done away with and telephones used exclusively in dispatching trains.

CHARLOTTE, N. C.—A big farmers' conference will be held in this place, one of the main objects being to provide a system of rural telephones for the entire county. The business men of Charlotte are actively co-operating with the farmers.

ITALY, TEX. (Ellis Co.)—The telephone plant in this place has been greatly improved within the past year. About $9,000 has been spent thus far in giving the town a good telephone system.

BARNESVILLE, OHIO.—The Belmont Telephone Company, operated in connection with the National Telephone Company, is erecting a new line between Barnesville and Woodsfield.

BARNESVILLE, OHIO.—The Belmont Telephone Company, operated in connection with the National Telephone Company, is erecting a new line between Barnesville and Woodsfield. Four No. 10 wires will be run through. The Cater company is acting jointly with the Belmont for part of the distance. New poles are being put up and curves eliminated wherever possible.

BUCYRUS, OHIO.—The Bucyrus Telephone Company, at a recent meeting of the stockholders, by a unanimous vote, decided to provide the city with an automatic telephone system. Installations will be commenced about the first of the year, and it is expected will be completed ready for operation about May 1, 1910.

JOHNSTOWN, PA.—The Johnstown Telephone Company is making arrangements to enlarge the capacity of its switchboards to 3,000 lines. It is expected, at the rate of increase of business now, that this enlargement will serve to take care of the business for possibly two years, when, under all probabilities, the switchboard will have to be doubled. The company reports that its long distance lines will also need enlarging and remodeling on account of the vast increase in business.

PHILADELPHIA, PA.—The Lehigh Valley Railroad has adopted the telephone system for regulating the operation of trains. Work has been commenced on a line between Mt. Carmel and Easton. The cost will be close to $40,000.

WHEELING, VA.—Work has been commenced by the Wheeling Traction Co. on the extension of a private line which the company has had in use for several years. New stations will be located at points on Bellaire lines, and a number of other places. The object is to provide a system of quick communication with the despatcher's office in case of accidents.

SPOKANE, WASH.—The Local and Long Distance Telephone

Company, Ltd., building west from Spokane to the coast, opened its lines as far as Reardon, Wash., a short time ago. This is the first line of an Independent company constructed west of Spokane. It is expected that within 30 days lines between Spokane and Davenport will be ready for operation, and the balance of the line is being rapidly pushed to completion.

WAUCONDA, WASH.—The U. S. Government is constructing telephone lines from this point to Anglin, and from here to Bodie, about 32 miles in length.

LETHBRIDGE, ALTA, CAN.—The Automatic Telephone Company will install equipment at this place and East Calgary at the instance of the Alberta Government. Several other cities will also be similarly equipped during the season.

WINNIPEG, MAN., CAN.—Long distance lines have been extended to St. Francois, Xavier, Man., and an office has been opened on the premises of Mr. R. P. Precourt.

WINNIPEG., MAN., CAN.—The extension of the Government telegraph lines north from Athabasca Landing to Lesser Slave Lake is expected to reach the lake this fall. The right-of-way has been cleared and the poles have been erected.

ELECTIONS.

GOLDEN, ILL.—The stockholders of the Golden Farmers' Telephone Company met recently and elected directors as follows: L. G. Clark, E. C. Sherrow, Andrew Bartell, Scott Taylor and John P. Beckman. This is a new company and a franchise will be applied for within a short time.

GOLDEN, ILL.—Recently the stockholders of the Golden Farmers Telephone Company met in Golden and proceeded to elect officers and outline the work of complete organization. The new organization has already been offered two through lines to Quincy, both giving excellent service. The directors elected at the meeting were L. G. Clark, E. C. Sherrow, Andrew Bartell, Scott Taylor and John P. Beckman.

LEEDS, ME.—The Farmers' Telephone Company held its annual meeting and elected W. Whitehouse as president, Lot Russell, secretary, and L. Howard, treasurer.

FLOODWOOD, MINN.—The stockholders of the Floodwood Telephone Company met recently. Business of the past year was discussed and developments for the coming year voted on. Officers elected for the ensuing year are: M. H. Schussler, president; W. A. Baune, vice-president and manager; C. R. Rutherford, treasurer and J. E. Brandmier, secretary.

LONG PRAIRIE, MINN.—Directors elected to serve the interests of the Pleasant Valley Telephone Company, to fill vacancies, are W. Huston chairman, and H. W. Kaemmer, secretary.

JERSEY CITY, N. J.—At a meeting of the stockholders of the Interstate Telephone Company of southern Illinois, held at Jersey City recently, Fred A. Dolph, J. F. Harral and A. R. Evans, of Aurora, Ill.; Charles King, of Jersey City, N. J., and C. H. Stetzel, of Wauseon, Ohio, were elected directors of the company. H. D. Wagner, at present president of the company, stated at the last meeting that when his time expired he would resign entirely, and it is expected that Mr. H. H. Evans will be elected to that office.

WHITE PLAINS, N. Y.—The Yorktown Telephone Company held its annual meeting a short time ago. Notwithstanding the company has spent more than $1,000 building an extension to Mahopac Falls and extending the service to new subscribers, a dividend was declared of 6 per cent. The officers elected were Theodore Tompkins, president; Floyd T. White, vice-president; E. B. Kear, secretary, and E. M. Frost, treasurer.

STILLWATER, OKLA.—The Payne County Telephone Company elected O. W. Triggs, Harry Jones and J. L. Briggs directors at a recent meeting. Mr. Triggs has charge of the construction of the new line being built to Springwater. All the old officers were re-elected.

MISCELLANEOUS.

CONWAY, ARK.—Mr. J. A. Frisby, manager of the Conway Telephone Company, states in a recent letter to this office that he has purchased the entire interests of the Home Telephone Company at Morrilton, Ark., and is now operating plants at Morrilton, Conway and Heber. He owns all the property mentioned except one-half interest in the Heber exchange.

SAN DIEGO, CAL.—The Home Telephone System, which was partially controlled by outside interests, recently passed entirely into the hands of San Diego capitalists. Horace B. Day and Judson Bent, of that place, purchased all the stock held by Messrs. F. F. Graves and J. Harris of Chicago. A new set of directors and officers was elected and stands as follows: H. B. Day, president; J. Bent, secretary; A. F. Sweet, H. E. Anthony, Harry Oesting, L. J. Rice, O. H. Savage and E. M. Barber. The total capitalization of this company is now $1,500,000. Many extensions and much improvement to the system are planned for the coming season. The Home Company likewise secured the contract for equipping the U. S. Grant Hotel with telephones, besides several smaller contracts.

SHEFFIELD, IA.—The holdings in the Peoples' Mutual Telephone Company, of this place, with exchanges operating in Chapin, Latimer, Alexander, Meservey, Thornton and Swalesdale, was sold to Daniel Murphy, of Greene, Ia., and G. A. Leonard, of Waterloo, Ia. Mr. E. N. Egge, the present manager of the company, will remain with the new owners as manager, and the new officers are G. A. Leonard, president, and Daniel Murphy, vice-president, and Mr. Egge, treasurer and secretary.

LEAVENWORTH, KAN.—Upon the recommendation of the Warden of the State Penitentiary the directors have decided to equip that institution with a private telephone exchange. Telephones will be installed connecting the towers and various departments inside the walls, and the central office will be located in the deputy warden's office.

PERRY, KANS.—The Roberts Telephone Company was sold to A. B. Frost. Mr. Roberts intends taking up law, which accounts for the sale. Mr. Frost likewise has control of the Ozawkie exchange.

LOUISVILLE, KY.—New Castle, the county seat of Henry County, was half destroyed by a fire a short time ago. The Cumberland telephone exchange was destroyed, among numerous other buildings.

ROCKPORT, KY.—The farmers of Ohio county have organized an Independent telephone company and are establishing their own exchanges over the county. They already have exchanges at several points, and the movement is spreading rapidly. The farmers claim that they are tired of paying the high rates charged by the operating company, and that they can run their own plants at about half what it would cost them to continue. A 100-drop board will be put in this city at an early date. The business men are co-operating with the farmers, and the new move will prove a big success, it is believed.

REED CITY, MICH.—Mr. Marshall, manager of the Citizens Telephone Company at that place, reports a very substantial growth since the first of March. Sixty-five telephones have been installed and the long distance service has been picking up materially. The service was greatly improved throughout the year.

ZANESVILLE, OHIO.—The new exchange of the Citizens' Telephone Company at Somerset was formally opened for operation a week or so ago. The company has on the waiting list contracts for 100 telephones to be installed, and it is expected that this will be trebled within a year.

NEW CASTLE, PA.—A report has been published in a newspaper to the effect that the New Wilmington and Plain Grove exchanges, both located near the county line between Mercer and Lawrence counties, were likely to be purchased by the American Telephone & Telegraph Company. Diligent inquiry has failed to reveal any foundation of truth for the report. Both exchanges are connected with the American Union Telephone Company by contracts which have some time to run, and no dissatisfaction whatever is reported.

WEST SHORE, PA.—The West Shore Telephone Company, of West Shore, Pa., which was organized a short time ago by Ernest H. Greenwood, of Camp Hill, who is vice-president of the company, is now giving service. The operating room contains a three-position switchboard for local service, and a one-position board for toll service. The line construction is entirely of copper, cables being run to all the towns in the territory. The subscribers of the American Union company are to be taken over by the West Shore company. New instruments have been installed in places where the old service was used and new wiring used throughout. The company starts operation with about 200 subscribers, but it is anticipated that the number will be doubled within 30 to 60 days. The board of directors consists of Dr. J. C. Stem, of Lemoyne; George Brady, of New Cumberland, and E. H. Greenwood. Mr. Reiff is secretary and treasurer of the company. Dr. John Bowman, Jacob Kinkle and Samuel Leach comprise the auditing committee.

WINNIPEG, MAN., CAN.—The Manitoba Telephone Commissioners have 3,000 applications for permission to build rural telephone lines.

PORT ARTHUR, ONT., CAN.—The City Council has decided to buy out all the holdings of the Bell Telephone Company at this place for $3,500.

WOODBRIDGE, ONT., CAN.—The Union Telephone Company is endeavoring to obtain permission to erect a telephone line in Etobicok Township.

CARIEVALE, SASK., CAN.—The Carievale Telephone Company, Ltd., was recently incorporated at this place.

NORTH PORTAL, SASK., CAN.—The North Portal Rural Telephone Company has received tenders for the construction of 31 miles of telephone lines.

REGINA, SASK., CAN.—The Provincial Government at this place has awarded the contract for the completion of the long distance telephone line from Saskatoon to Prince Albert, and the line will be completed by fall.

MADRID, SPAIN.—Le Boletin Oficial del Cuerpo de Telegrafas publishes a law according to which the government of Spain has been authorized to spend 10,000,000 pesetas in the reorganization and development of the telegraph and telephone service. Of this sum 1,895,670 pesetas will be expended on land lines, 2,116,000 on submarine cables, and 106,626 on telephone instruments; 4,618,607 pesetas will be allotted to the extension of telephones and telegraphs, and will include the cost of connecting 382 offices where there are more than 4,000 inhabitants, with the telegraph system, and 846 offices, where there are less than 4,000 inhabitants, with the telephone system, as well as 1,235 localities where the inhabitants number less than 2,000. The remaining 1,263,096 pesetas will be devoted to the construction of telegraphs to places willing to furnish the necessary poles, and it is calculated that of these there are 1,235.